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F. H. Dickson

Collins Radio Company

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13 ABSTRACT

Four major areas of activities in support of packet radio communications are reported in this document. These are: 1) evaluation and selection of radio link parameters for experimental packet radio system, 2) evaluation and selection of modulation and synchronization methods for experimental system, 3) equipment components analysis, 4) propagation/noise measurement equipment design data. Radio link parameter selection includes frequency range, data rates, antenna type, and expected ranges. Modulation and synchronization evaluation is based on both performance and implementation. Component evaluation consists of technological assessment in surface acoustic wave devices, RF sources, antennas, and microprocessors for packet radio application. A brief technical description and detailed design package including schematics and photographs of the propagation/noise measurement equipment are also reported.

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Volume 2

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F. H. Dickson

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4.1 INTRODUCTION

The purpose of this document is to provide a summary of the test objectives and characteristics of the ARPA packet radio propagation and noise measurement equipment. The main body of the volume is an overview and technical design summary. The details of the design are contained in the appendices.

The propagation test set has been designed to support the packet radio propagation measurement program. Emphasis in this test program is to be given to propagation characteristics that are most significant to transmission of digital signals. Measured data exists to predict path attenuation in the various environments in which the packet radio system is to operate, but there exists very little information relative to the multipath spread characteristics and the short period distribution of impulsive noise. These characteristics will have a significant impact on both system and equipment design for the packet radio systems. The propagation test set has been designed primarily to provide more information on these two important characteristics, and also provide facilities to measure net path loss and doppler spread. Since both the obstruction attenuation and noise level is expected to vary with frequency, measurements are to be made at two frequencies (430 and 1370 MHz).

The test set consists of a transmitter and receiver. The transmitter generates data bits at approximately 79 kb/s or 158 kb/s, which are then code spread to a 10 M-chip or 20 M-chip modulation rate using a 127 chip maximal length code. The chips biphase modulate the two rf carrier frequencies. The 430 MHz output power is 10 watts and 1370 MHz, 6 watts. A high-gain omni antenna provides 2-dBi gain for 430 MHz and 9 dBi for 1370 MHz. Both frequencies can be radiated simultaneously.

The receiver has two fixed-frequency front ends but a common if. allowing only one frequency to be received at any one time. Surface Acoustic Wave Devices (SAWD's) provide demodulation and decoding for each data rate. The output data signal is correlation pulses of approximately 2 chips duration. For measuring doppler effects, all frequencies in the transmitter and receiver are phase locked to their respective precision frequency standards. The frequency standard in the receiver can be adjusted to obtain synchronization with the transmitter standard, thus allowing doppler frequency shift to be detected. For noise pulse measurements, a 50-dB dynamic range threshold detector is provided that operates at the if. frequency. One-tenth microsecond impulses can be detected and their level measured. The receiver antenna provides 2-dBi gain at both 430 MHz and 1370 MHz.

The time to design and build a test set was to be held to a minimum so that the collection of data could be started at the earliest possible date. A cost conscious, one-of-a-kind test set was constructed. Standard, available module packages were used to house the receiver and transmitter circuits. This was selected for design simplicity, flexibility, and minimum cost. The circuits contained in these modules are a mixture of printed circuit cards and board assemblies that have the components mounted on standoffs. The boards are non-standard Collins construction, but were selected as the most effective way to get the job done within the cost and schedule objectives. The flexibility of the equipment design and

construction has been of value in the test program, allowing modifications to satisfy test program requirements.

Problems arose during the building of the equipment with vendor parts availability and changes in the desired test set performance. The following is an overview of some of the performance problems and the corrective action taken:

The test set was orginally designed and delivered to Stanford Research Institute to operate at 430 MHz and 1325 MHz. The 1325-MHz frequency under code spread occupies a 40-MHz bandwidth. Within that bandwidth are FAA flight control radars with high-gain directional antennas. The test set and the radars could not coexist. As an interim solution, a transmitter burst mode control was designed and built so that the test set transmitter could be synchronized with the radar sweep. The test set transmitter was inhibited when the radar was looking in its direction. This worked satisfactorily but the test set was later modified to operate at 1370 MHz.

Coexistence with other transmitters was also found to be a problem in the test set receiver at 430 MHz. In a per hertz bandwidth, some narrow band interfering signals appear at the receiver if. as high as 60 dB greater than the spread spectrum signal. The receiver was originally set to provide a desired signal at 0 dBm output from the 140-MHz if. The amplifier limits at +5 dBm, so even in the manual gain mode, the desired signal available to the SAWD's was much lower than planned (in the presence of interference) due to the limiting action and suppression of the weaker spread spectrum test signal. The receiver was modified to provide 13 dB more gain after the SAWD's so that the if. prior to the SAWD could be operated at lower gain and hence in a more linear region. Although there was an improvement, the dynamic range of the if. is still not adequate to coexistence at 430 MHz with some of the stronger narrow-band signals present in the test area.

A low side injection frequency (290 MHz) was used for the 430-MHz down-converter. A mixing product appears at 150 MHz within the dynamic range of the threshold detector which masks some of the noise data to be collected. The test set allows an external synthesizer signal to be injected into the down converter in place of the internal local oscillator. This was done to allow high-side injection and still retain phase lock with the 10-MHz receiver standard.

A phase jitter problem also became evident after the 1370-MHz conversion at SRI which affected doppler measurement. For the doppler tests, the external synthesizer approach was again used to provide an injection signal with low phase noise. This local oscillator phase noise problem will be corrected after testing by SRI is complete.

In summary, the test set was designed, fabricated, and modified on a short time schedule responsive to SRI's testing requirements. Although some problems were experienced with the test set, they were either corrected or the equipment flexibility allowed a fast effective alternative means of operation. The test set has not only provided the propagation and noise data for which it was designed, but also provided better insight into the problems of co-existence between spread spectrum and conventional systems.

4.2 TECHNICAL DESCRIPTION

4.2.1 Elements of the Test Set

The following lists the major items of the test set, CPN 627, 9553-001

Items	Collins Part Number
Transmit Subsystem	
Transmitter	627-9561-001
CW Transmitter Control	627-9562-001
Burst Mode Control	631-7575-001
Antenna 9 dBi at 1370 MHz, 2 dBi 430 MHz	627-9502-001
2 dBi at both frequencies	627-8137-001
Receive Subsystem	
Receiver	627-9541-001
Receiver Power Supply	627-9555-001
Antenna	627-8137-001
Threshold Detector	627-9564-001
Miscellanous Cables	627-9563-001

The transmitter is packaged in a weather protective box for mounting on a pole. A bracket on the transmitter allows convenient antenna mounting. Cables were provided to allow installation of the controls inside a building.

The receiver subsystem is mounted with SRI equipment. The threshold detector module was integrated into one of their panels. The power supply and receiver are 19-inch panel mount units.

4.2.2 Transmitter Characteristics

Figure 4-1 shows the block diagram of the transmit system. Figures 4-2 through 4-4 show the transmitter, transmitter control, and the burst mode control, respectively. The control panel is essentially a grouping of switches that control power and termination of four TTL mode control lines. Remote control is also available by selection. The burst mode control contains a variable rate generator to determine cycle time and a duration timer to select the duty cycle of the transmitter. The rate generator can be operated from an external sync derived from a cyclic radar or other user with which the test set must coexist. The rate generator range is continuously variable from 0.25 to 20 Hz in the cycle mode. The burst durations are selected to be 20, 40, 80, 160, 1000, and 5000 μs long. The burst control gates the TTL mode control lines from transmitter standby code to whatever mode was selected on the control panel. A light on the front panel indicates when the transmitter is enabled.

The transmitter contains a precision 10-MHz frequency standard and a 430-MHz and 1370-MHz oscillator phase locked to the standard. The rf frequencies are supplied to balanced mixers which biphase modulate the carrier according to the code generator chip data. Each biphase modulated output is amplified and radiated from its own set of dipole elements in a colinear antenna mast. The transmitter antenna gain is 2 dBi at 430 MHz and 9 dBi at 1370 MHz. The antenna is shown in figure 4-5.

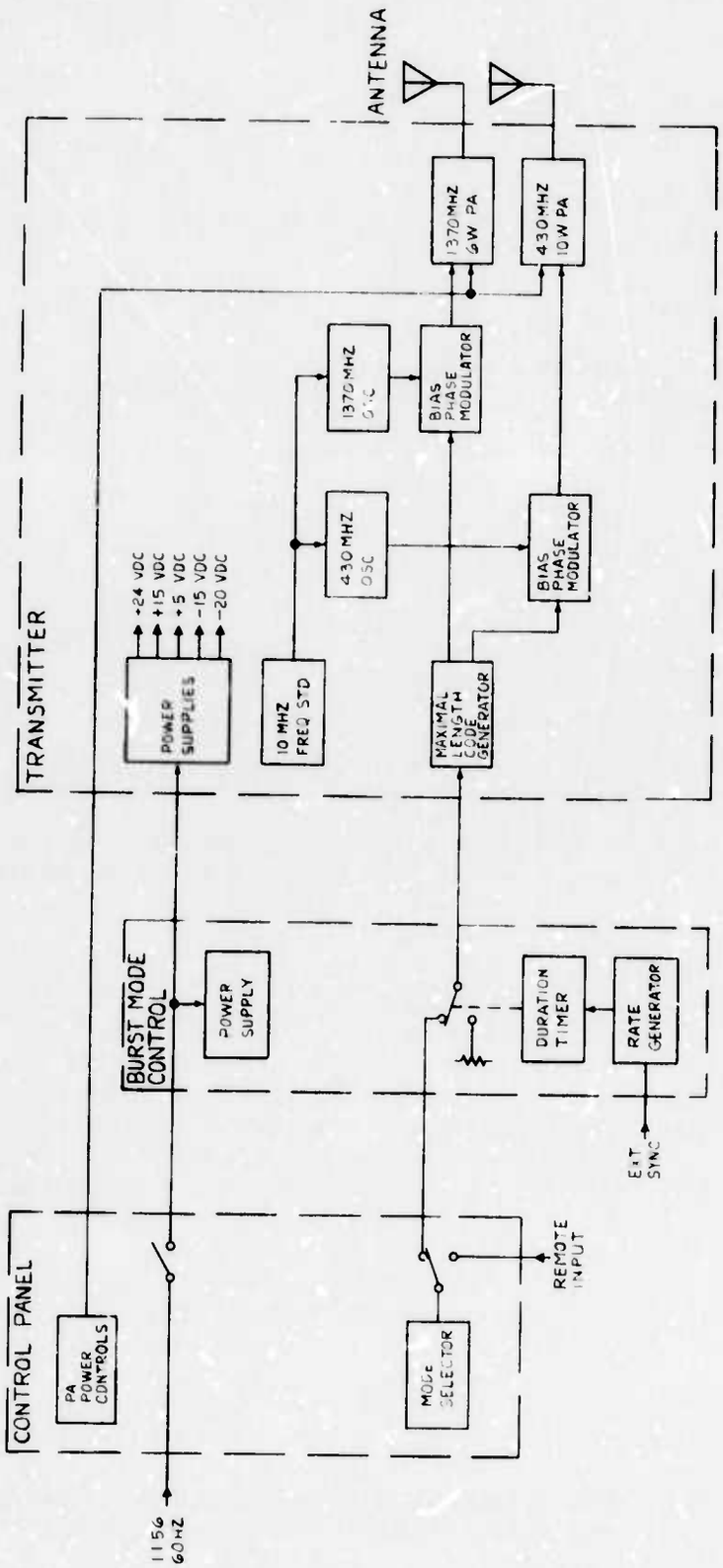

Figure 4-1. Transmit System Block Diagram.

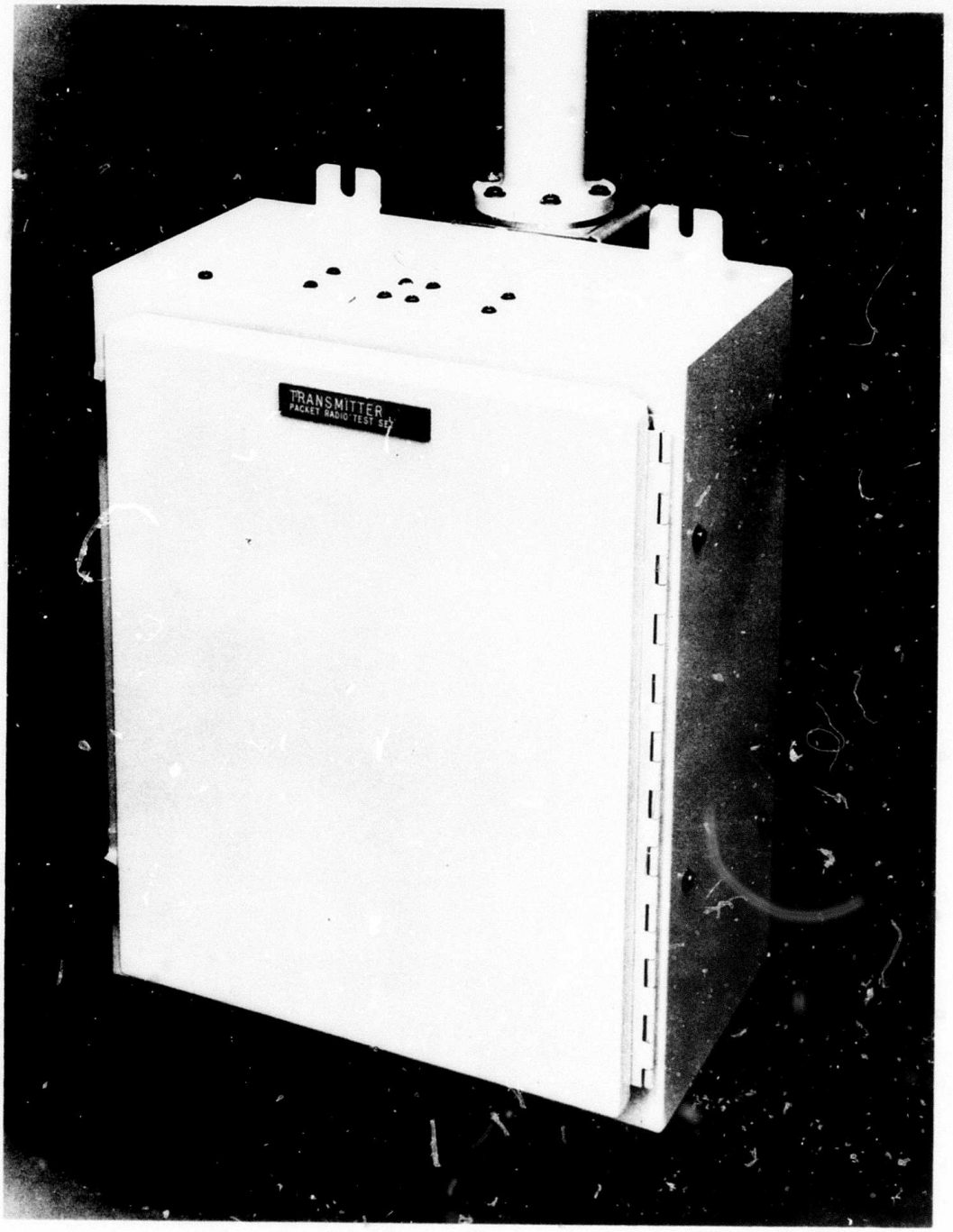

Figure 4-2. Transmitter.

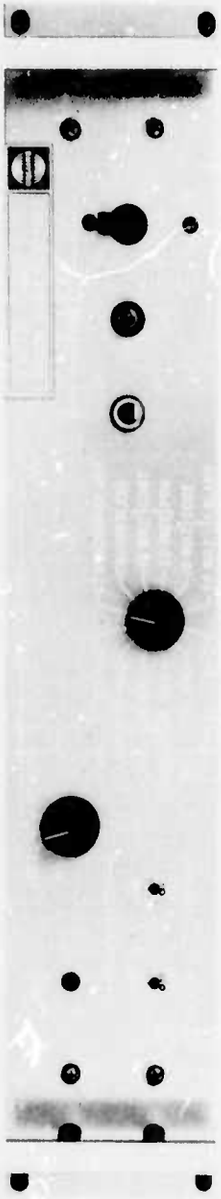

Figure 4-3. Transmitter Control.

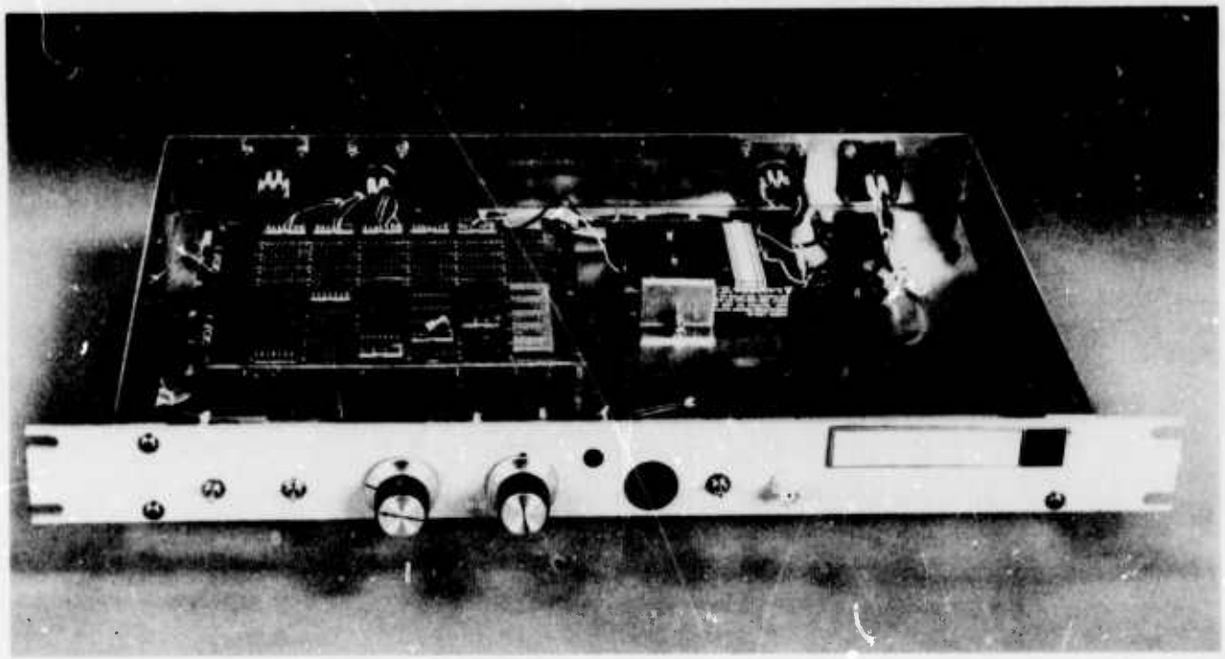

Figure 4-1. Burst Mode Control.

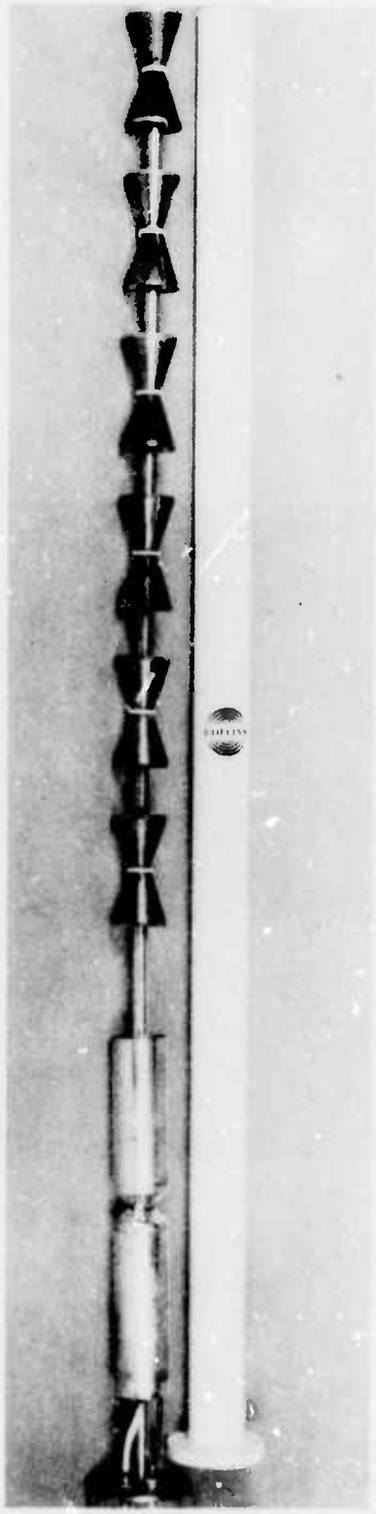

Figure 4-5. High-Gain Antenna.

4.2.3 Receiver Characteristics

Figure 4-6 shows the receive system block diagram. Figure 4-7 shows the front panel of the receiver which is arranged to aid an operator in understanding the signal flow without studying the schematics or detailed system diagrams. Maximum flexibility is provided at the receive front panel to monitor signals or inject signals. The 10-MHz frequency standard is available for reference input to an external synthesizer that can be used to generate injection frequencies for the down-converters. The if. is available to be used with a spectrum analyzer to monitor the received signal and interference. The receiver outputs are available at the rear of the unit and also available on the front panel.

The receive system antenna is a low-gain, colinear, dipole antenna with separate dipoles for 430 MHz and 1370 MHz. Each dipole yields a 2-dBi gain. The antenna construction is shown in figure 4-8.

Each receive frequency has its own rf front end consisting of a 3-pole, 50-MHz bandwidth filter and a low-noise rf amplifier. The down converters are double balanced mixers followed by 140-MHz if. preamplifiers. The receive channel select function chooses if. preamplifier output is selected for detection. When the selection is made, power to the rf amplifier and if. preamplifier of the unselected frequency is turned off.

The if. bandwidth can be either 50 MHz or 500 kHz. If the 500-kHz bandwidth is selected, gain is added in the if. switching module to compensate for reduced noise bandwidth. As a result, the noise threshold detectors operate at a fixed level of spectral density independent of the bandwidth setting.

The if. age amplifier maximum gain is > 60 dB and can be adjusted manually or by age for -13-dBm output. This gain plus the front end gain of approximately 30 dB allows thermal noise to be amplified to the -13-dBm level, thereby providing adequate gain for any usable signal.

The SAWD correlators provide approximately 20 dB of processing gain so that 0 dB input signal-to-noise levels will provide useful output. The if. frequency is actually 139.98 MHz due to the manufacturing tolerance of the SAWD's. The detector has a 13-dB linear dynamic range from the maximum output level of approximately 5.0 volts peak. The detector output impedance is 50 ohms.

The doppler test function compares a received CW signal converted to 140 MHz if. and a 140-MHz frequency obtained from a local oscillator phase locked to the precision 10-MHz frequency standard. The frequency standard can be manually synchronized with the transmitter frequency standard or locked through a very slow phase-lock loop for short period doppler measurements. The bandwidth for measuring doppler is approximately 100 Hz.

The down-converter injection frequencies are also phase locked to the precision 10-MHz standard.

The threshold detector consists of six stages of amplification at 140 MHz. Each amplifier has a detector and comparator that will level detect noise impulses of less than 0.1 μs in duration. Each stage adds 10 dB of gain so that 0 to -50-dB levels in 10-dB steps are detected. Since the radio gain preceding this module is approximately 30 dB, noise impulses from -30 to -80 dBm can be monitored. The detector outputs are differential MECL integrated circuits. A secondary output allows the detected outputs to be monitored on the front of the receiver. This is of value for threshold level calibration.

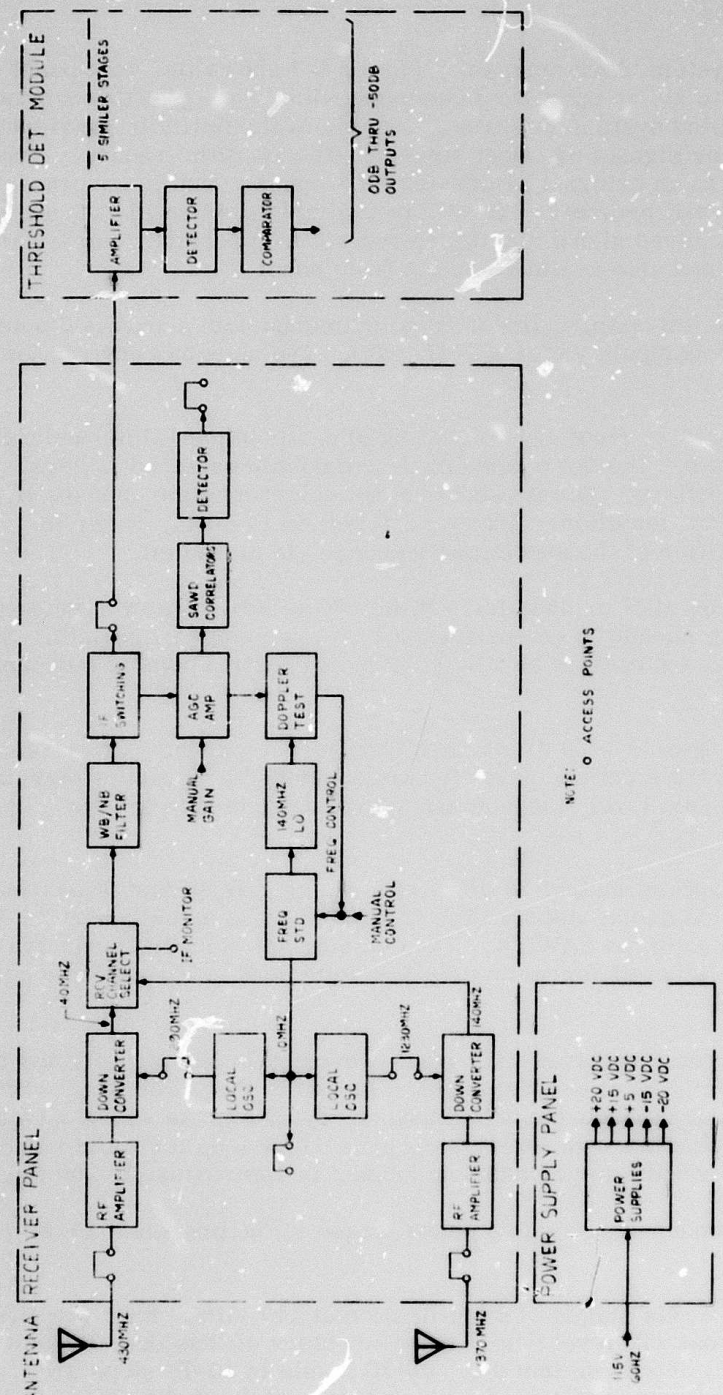

Figure 4-6. Receiver System Block Diagram.

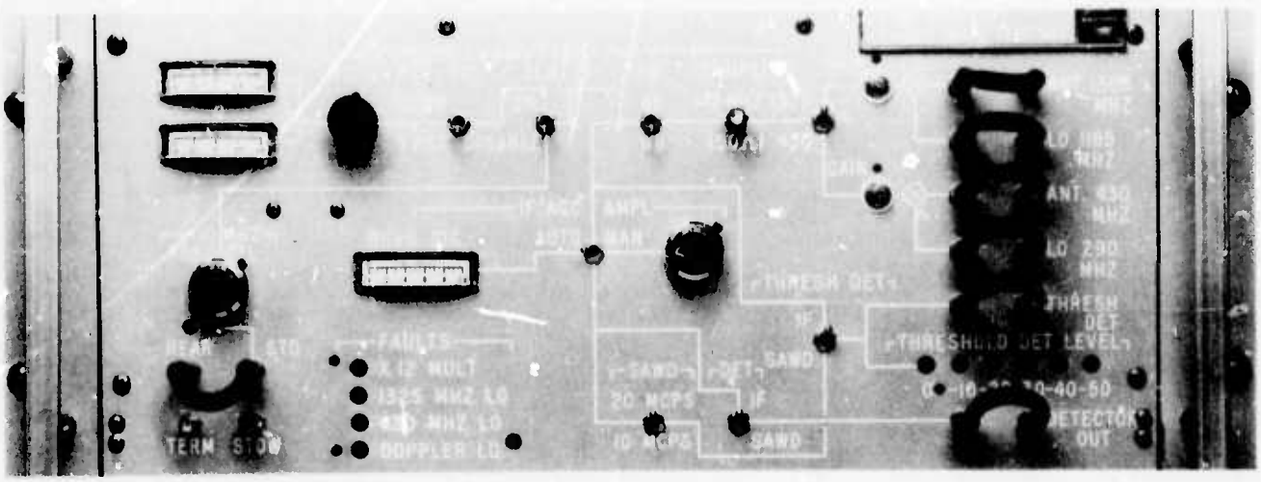

Figure 4-7. Receiver System Front Panel.

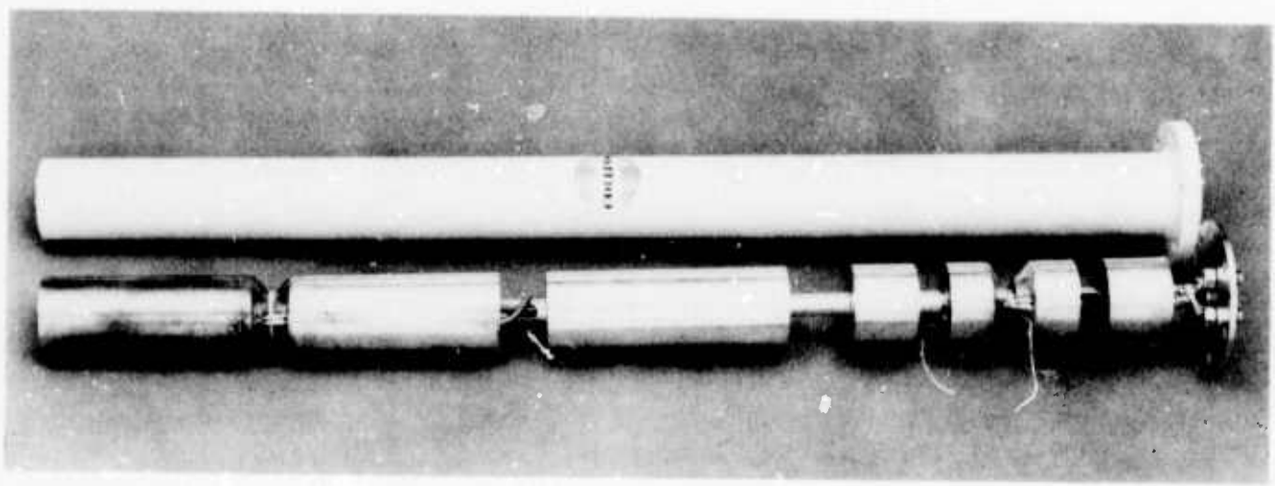

Figure 4-8. Low Gain Antenna Construction

4.2.4 Specification Summary

TRANSMITTER AND CONTROL

Frequency Bands	-430 MHz and 1370 MHz
Output Power	-430 MHz — 10W -1370 MHz — 6W
Output Filters	2 Pole 40 MHz BW centered on output frequencies
Modulation	Biphase at a 10 M-chip or 20 M-chip rate
Frequency Stability	All frequencies locked to 10-MHz standard
Aging Rate	$<5 \times 10^{-10}$/day after 24 hour warmup
Stability	1×10^{-11} for 10 seconds average time
Temp Coefficient	$< 1 \times 10^{-9}$ over 0 to 70°C.
Warmup	Within 5×10^{-9} of final frequency in 15 minutes after turnon at 25°C
Data Rate	78.74 kb/s and 156.48 kb/s
Coding	127 chip maximal length code
Input Power	115V 60 Hz
Controls (Front Panel)	
Power	On-Off
430 MHZ PA	On-Off
1370 MHZ PA	On-Off
Mode Control	

ABCD	CONTROL OPTIONS
TTL LEVEL CONTROL INPUT	RESPONSE
0000	STANDBY, CARRIER OFF
0001	140MHZ CW (DOPPLER)
0010	CONTINUOUS PRN, 10 MHZ
0011	CONTINUOUS PRN, 20 MHZ
0100	CODE/1 BLANK, 10MHZ
0101	CODE/1 BLANK, 20MHZ
0110	CODE/3 BLANK, 10MHZ
0111	CODE/3 BLANK, 20MHZ
1000	CODE/1 CARRIER, 10MHZ
1001	CODE/1 CARRIER, 20 MHZ
1010	CODE/3 CARRIER, 10MHZ
1011	CODE/3 CARRIER, 20MHZ

Local Remote Mode Selection

Indicators (Front Panel)	Power On
	Fault Summary
	Note — The control panel fault is a loss of phase lock of any of the phase-locked loops. Individual loop indicators are inside the transmitter cabinet
Antenna(s)	High gain omni colinear must
	1370 MHz 9 dBi 430 MHz 2 dBi
	Optional antennas
	A directional 10-dBi horn for 1370 MHz was provided to SRI
	A 2 dBi low-gain antenna same as the receiver antenna was also provided.

BURST CONTROL PANEL

Note that this panel is required only if the system is to be operated in the burst mode. The cables from the transmitter will connect directly to the control panel or can be fed through the burst mode control.

Power	115V 60 Hz
Repetition Rate	0.25 Hz to 20 Hz (continuously variable)
Burst Duration(s)	20, 40, 80, 160, 1000, and 5000 μs
Controls (Front Panel)	Repetition rate
	Burst duration
	Mode(s)
	Cycle or single burst
	Normal or burst mode
	Sync button which initiates single burst
	Sync internal — external
Indicator (Front Panel)	Rate light that shows when transmitter enabled.

RECEIVER

Receive Signal Range	0 to -90 dBm
Frequency Bands	430 MHz and 1370 MHz

RF Filters	3 pole 50 MHz BW centered on receive frequencies
RF Amplification	> 12 dB (noise figure < 3.5 dB)
Receiver Noise Figure	< 8 dB
IF. Frequency	139.980 MHz
IF. Gain	> 60 dB
Demodulation and Decoding	10 M-chip and 20 M-chip SAWD's; 127-chip maximal length code biphase modulation construction
Processing Gain	20 dB
Frequency Stability	Same as transmitter
	For doppler tests, the frequency standard can be electrically shifted ≥ 1 x 10^{-7} ppm
Doppler Test Bandwidth	100 Hz
Input Power	115V 60 Hz
Outputs	10 MHz frequency standard 0 dBm 50Ω
	IF output (Input signal level plus approximately 30-dB gain, 50 Ω)
	Detected signal out 5V peak from 50 Ω source
	Analog agc level (0 to +15V)
	Doppler I&Q outputs (each 0 ± 5V)
Controls (Front Panel)	
Gain	To balance rf receive level of 430 MHz and 1370 MHz
Bandwidth Selection	50 MHz or 500 kHz
AGC Amplifier	Automatic (-13 dBm output) or manual.
Manual AGC Gain	10 turn pot for > 60-dB range
SAWD	Selects output from 20 M-chip or 10 M-chip SAWD
Detector	Selects whether the if. or SAWD output will be detected
Threshold Detector	IF-SAWD
	Only the if. signal is now available for switching. The SAWD signal is available at the STOW SMA connector and can be patched to the threshold detector.

10-MHz Frequency Control	Shifts 10-MHZ frequency standard
Doppler Test	In ON position causes doppler unit to control the 10 MHz frequency standard to obtain synchronization with transmitter.
10-MHz Phase	This controls the phase lock angle after doppler synchronization.
ØLL Time Constant	Controls setting time, of synchronization
Indicators (Front Panel)	Doppler I&Q channels
	Receive Signal Strength — Only operational in auto agc mode
	Faults — Loss of phase lock for the receiver loops
	Threshold Detector — Sense monitors
Threshold Detector	0 to -50-dBm range in 10-dB steps
	Output — Differential MECL levels for each 10-dB level detector
	Response time < 20 ns
Antenna	Colinear 430-MHz and 1370-MHz dipoles each 2-dBi gain

A.1 INTRODUCTION

This appendix contains pictures of the test set and detailed schematics of the equipment. The pictures reflect a variety of construction techniques from printed circuit cards to brass board type modules. This construction is not Collins normal practice, but was the most cost-conscious and efficient means to provide a usable one-of-a-kind test set in a minimum amount of time. The schematics represent the circuits as they exist as of this report. The pictures and schematics are felt to be self-explanatory and are thus presented without narrative in the order shown in the index for this appendix.

NOTE

In some cases, 1325 MHz and 1370 MHz are both shown in the documentation. Due to coexistence problems at 1325 MHz, the test set frequency was changed to 1370 MHz. Any reference to 1325 MHz should be interpreted as being the 1370-MHz channel.

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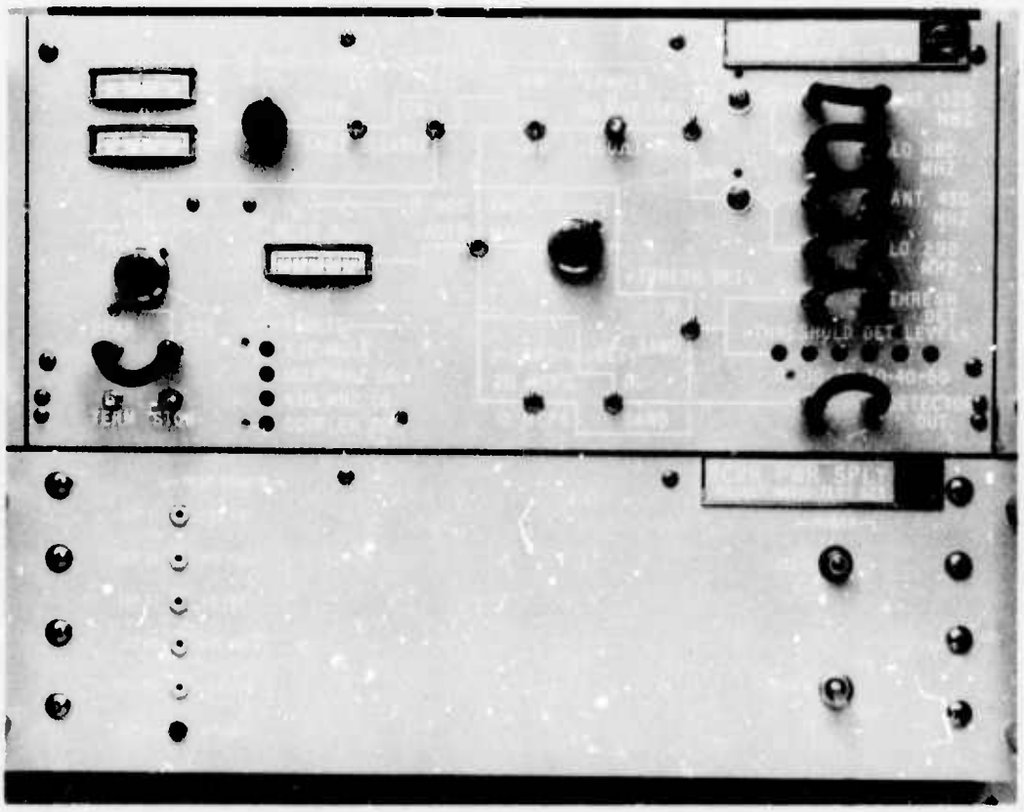
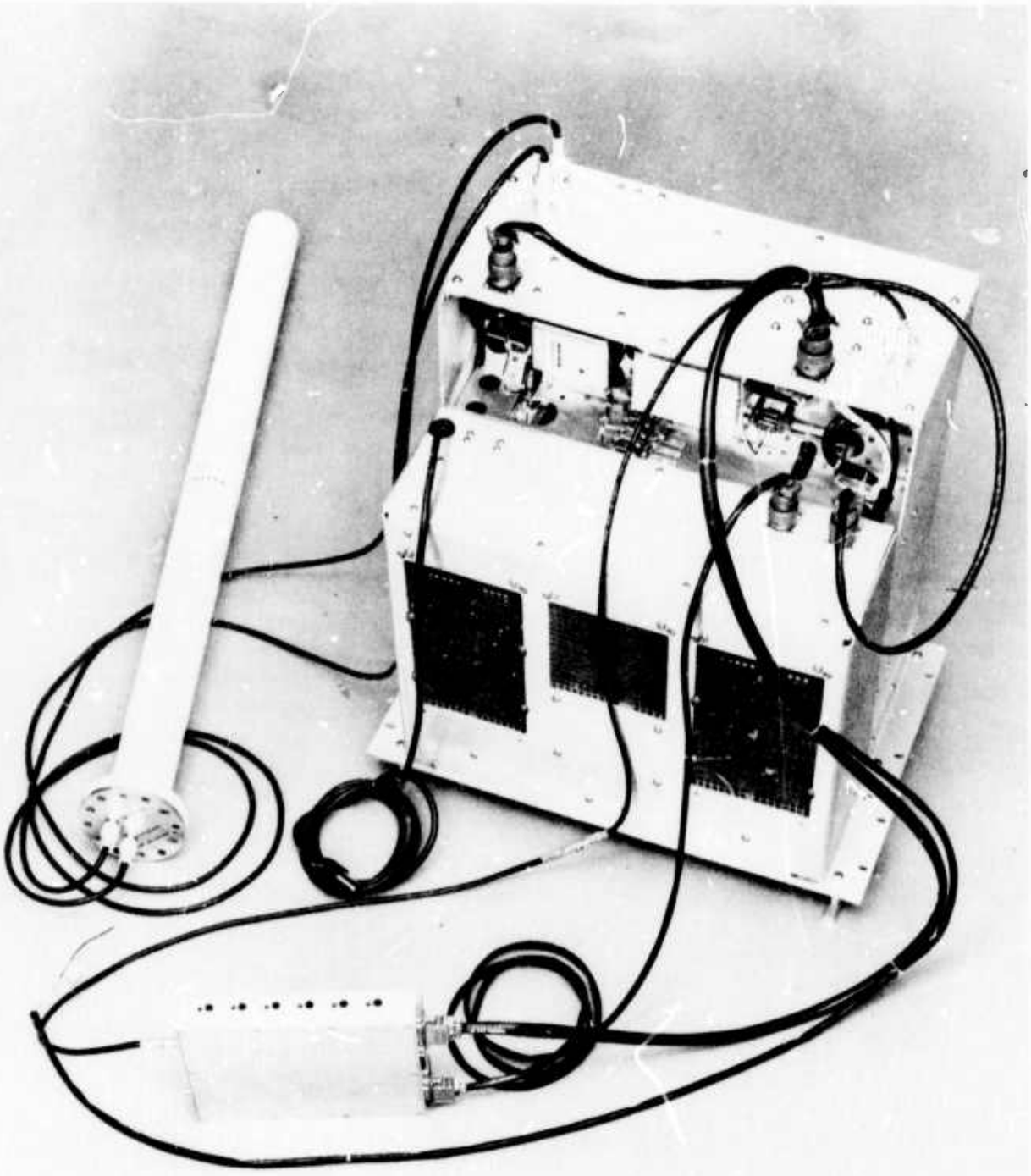
*1370 MHz.

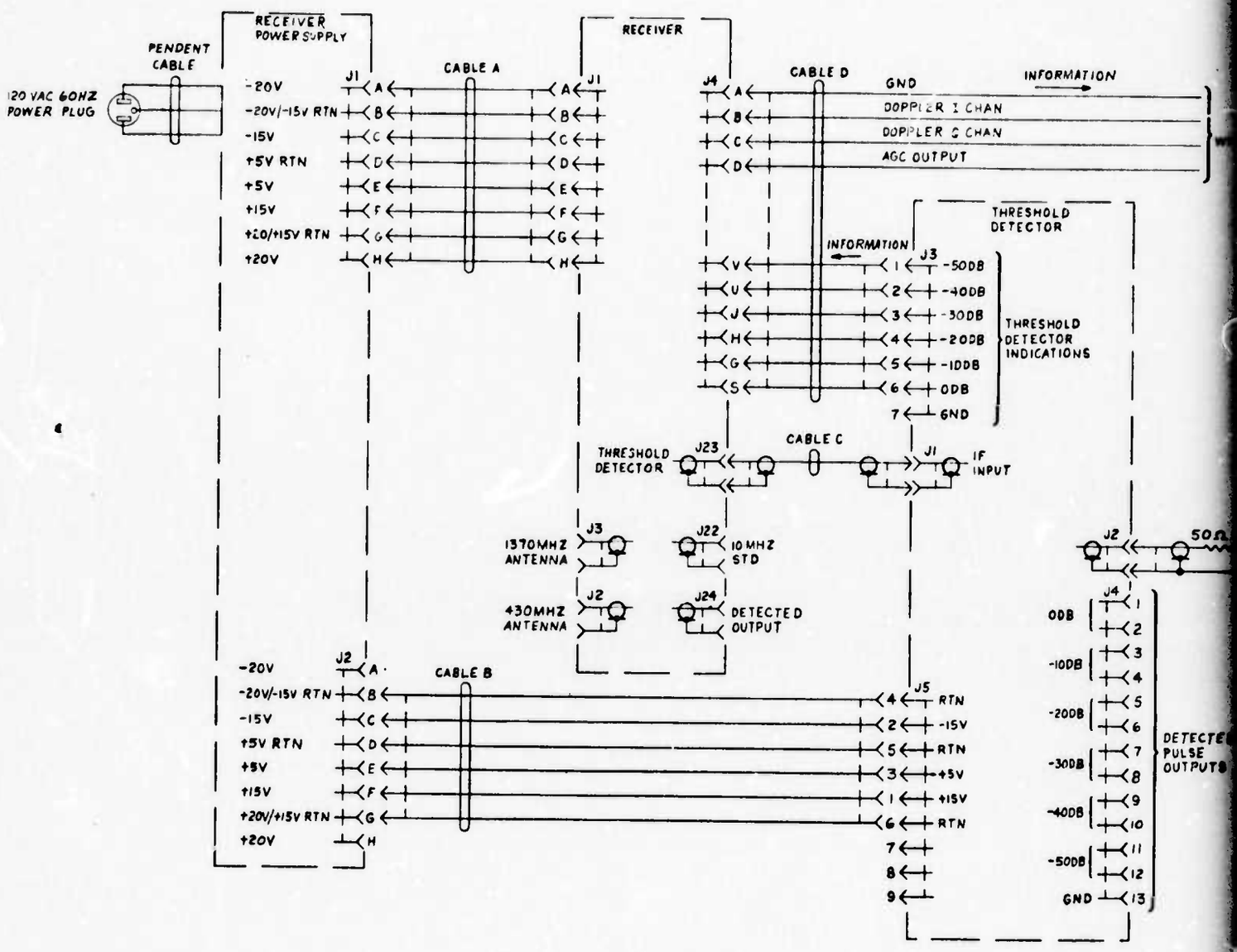


Front View RCVR & PS



Receiver System

NAME	DATE
REDR	
CHK	



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NOTES

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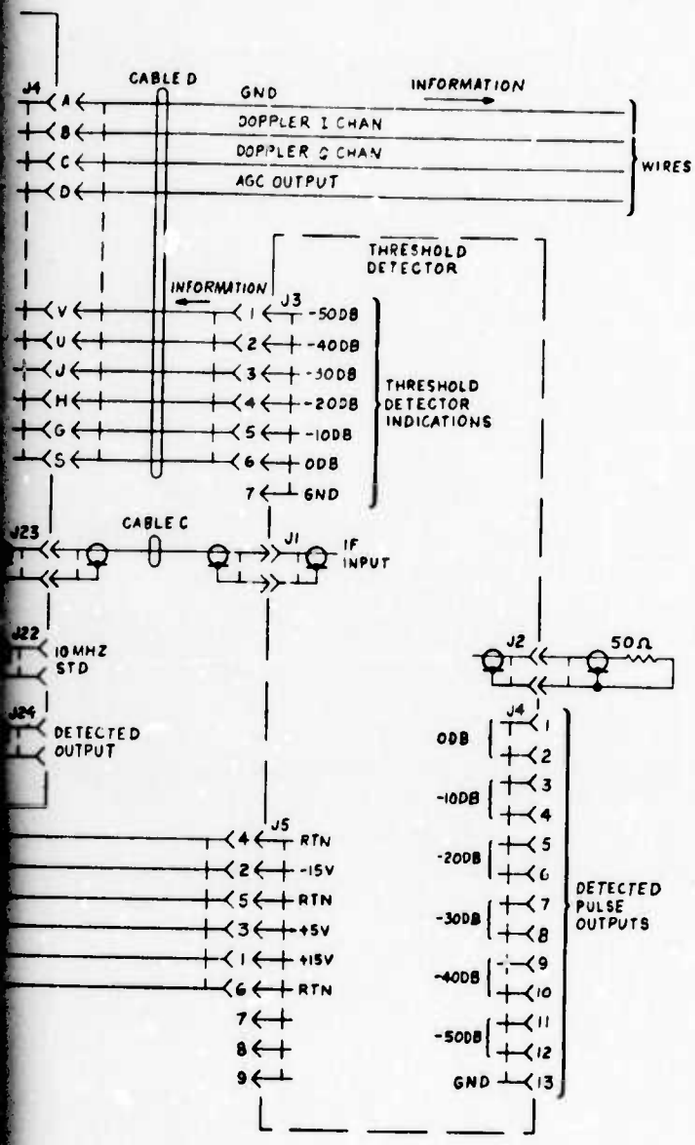

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PUB DWG NO					
SIZE	GUIDE & PEN	LINE WT	FINAL SIZE	%	

CONTRACT NO		
	NAME	DATE
DR	[illegible]	3/30/74
CHK		
APPD		

COLLINS RADIO COMPANY
CEDAR RAPIDS, IOWA · NEWPORT BEACH, CALIF · DALLAS, TEXAS · TORONTO, ONTARIO

CABLING DIAGRAM
RECEIVE SYSTEM

SIZE	CODE IDENT NO	DWG NO
D		631-9566

SCALE | SHEET OF

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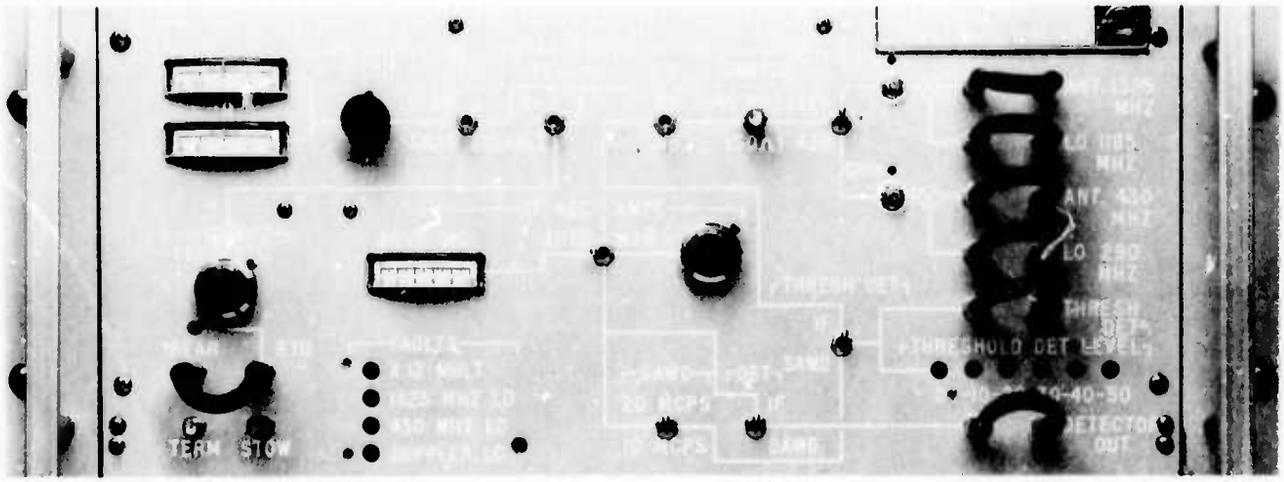
B


ANT 430
MHZ
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MHZ
THRESH
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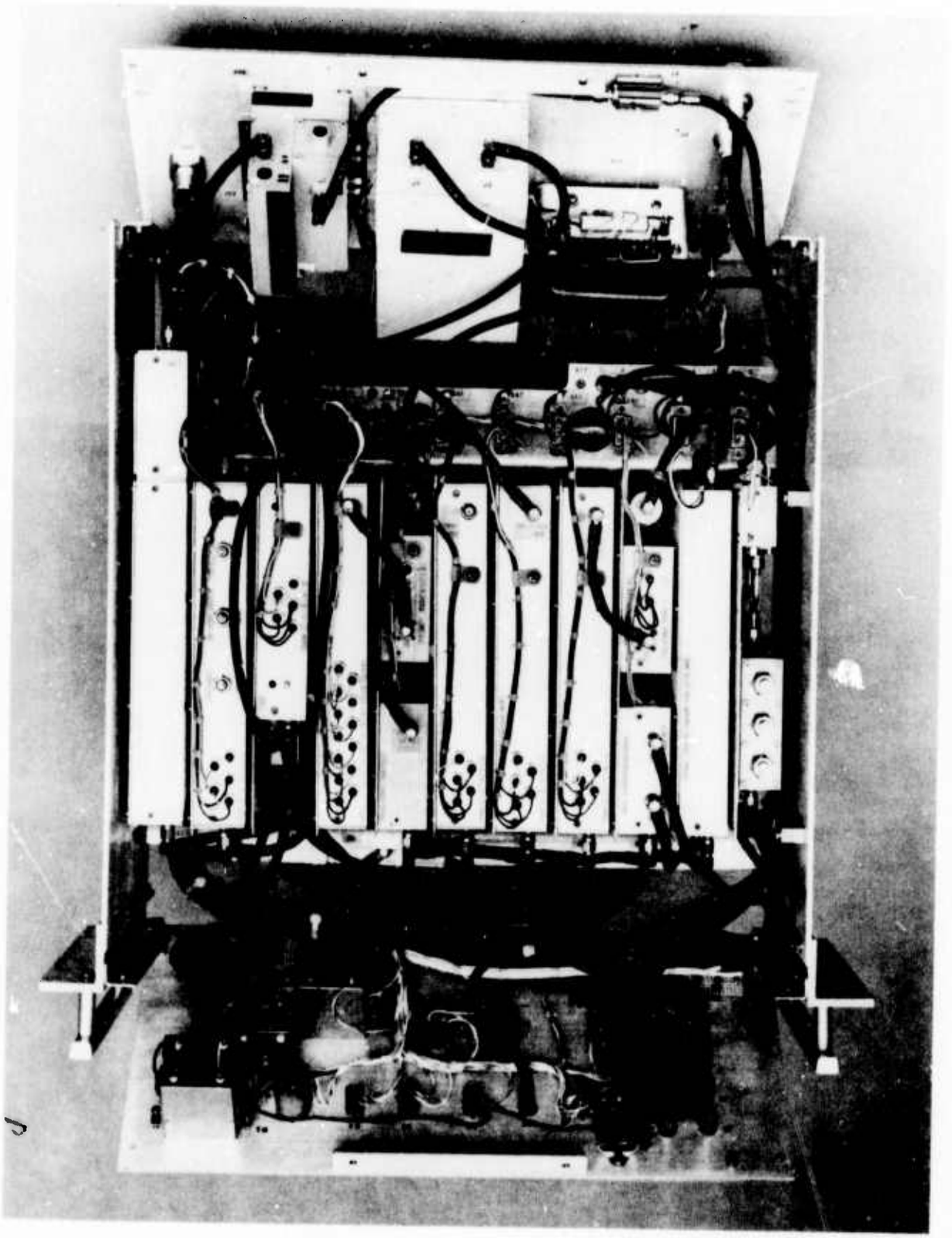
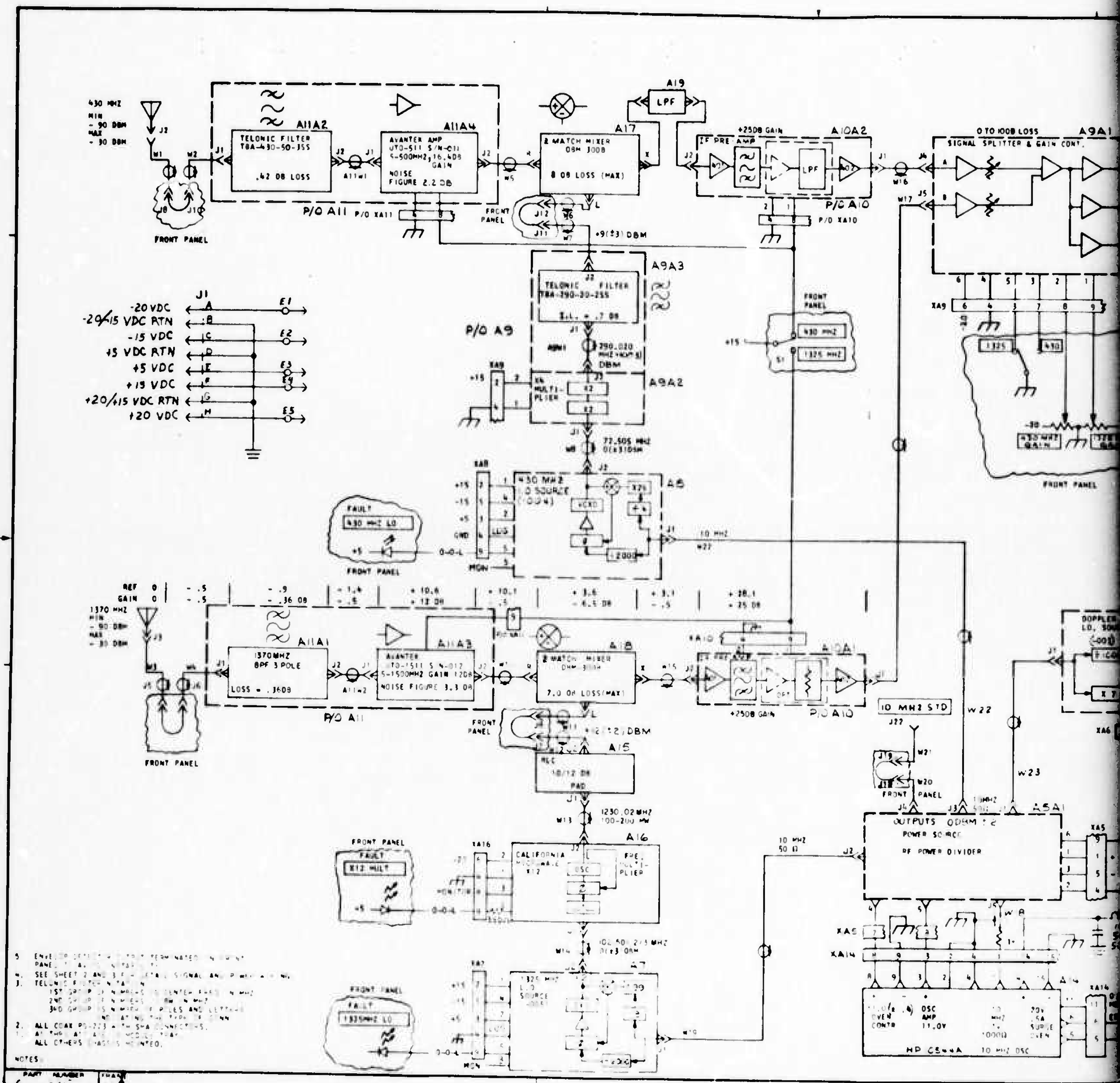
+THRESHOLD SET LEVEL
10-20-40-50
DETECTOR
OUT
20 RCPS

Front Panel



Internal Assemblies


430 MHZ
TELONIC FILTER
TBA-430-50-3SS
.42 DB LOSS
A11A2
AVANTEK AMP
NOISE FIGURE 2.2 DB
A11A4
A17
A19
LPF
8 DB LOSS (MAX)
P/O A11
FRONT PANEL
+25DB GAIN
A10A2
IF PRE AMP
P/O A10
0 TO 100DB LOSS
SIGNAL SPLITTER & GAIN CONT.
A9A1
+9(±3) DBM
A9A3
TELONIC FILTER
A9A2
P/O A9
J1
-20VDC
-20/15 VDC RTN
-15 VDC
+5 VDC RTN
+5 VDC
+15 VDC
+20/15 VDC RTN
+20 VDC
430 MHZ
1325 MHZ
72.505 MHZ
430 MHZ LO SOURCE
A8
FAULT
430 MHZ LO
10 MHZ
1370 MHZ
A11A1
1370MHZ BPF 3 POLE
A11A3
A18
2 MATCH MIXER
7.0 DB LOSS(MAX)
P/O A11
P/O A10
+25DB GAIN
10 MHZ STD
W22
W23
A15
A16
CALIFORNIA MICROWAVE X12
FAULT
X12 MULT
1230.02 MHZ
A7
1325 MHZ LO SOURCE
FAULT
1325MHZ LO
A5A1
OUTPUTS 0DBM ±2
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HP C5144A 10 MHZ OSC
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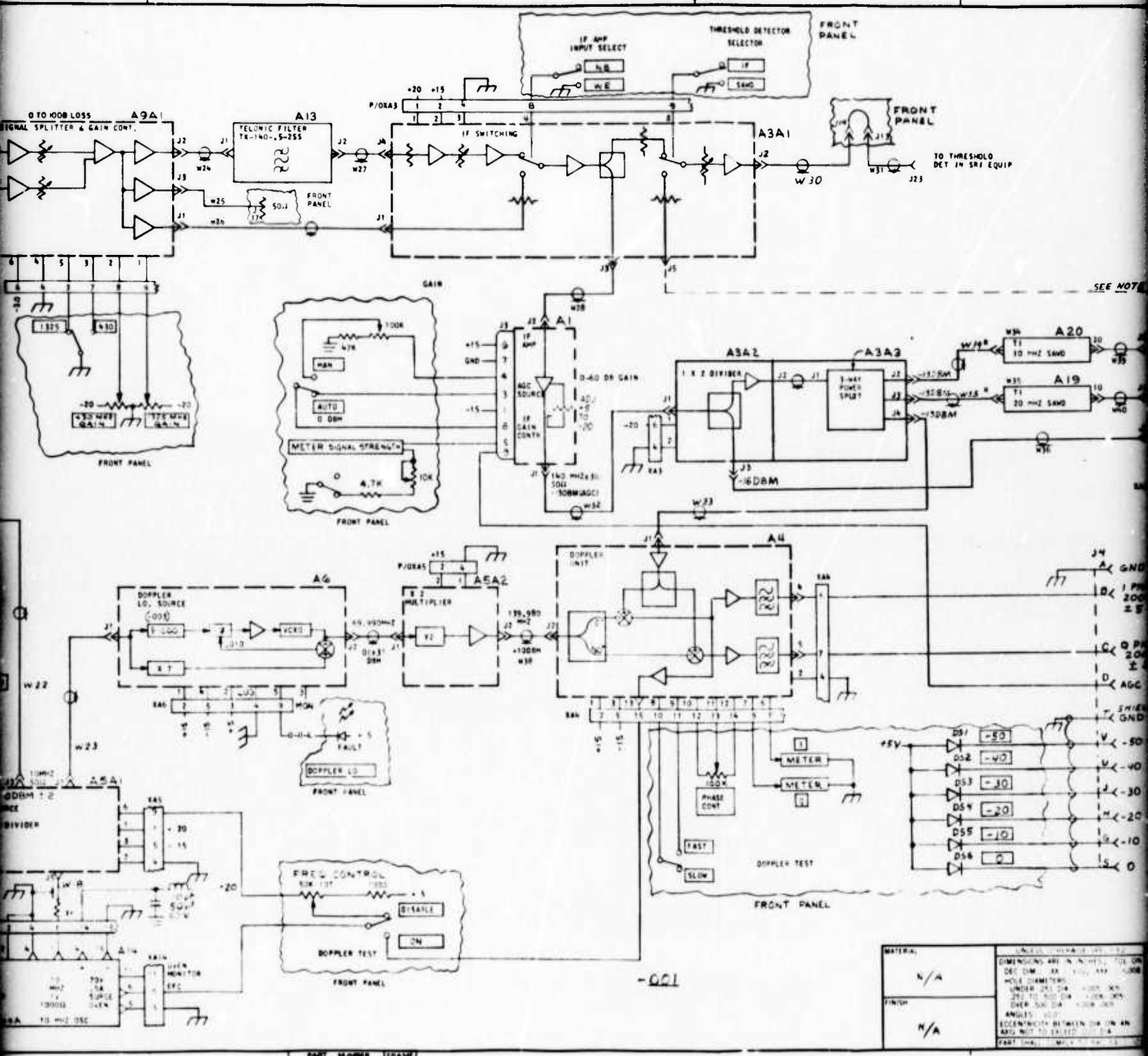
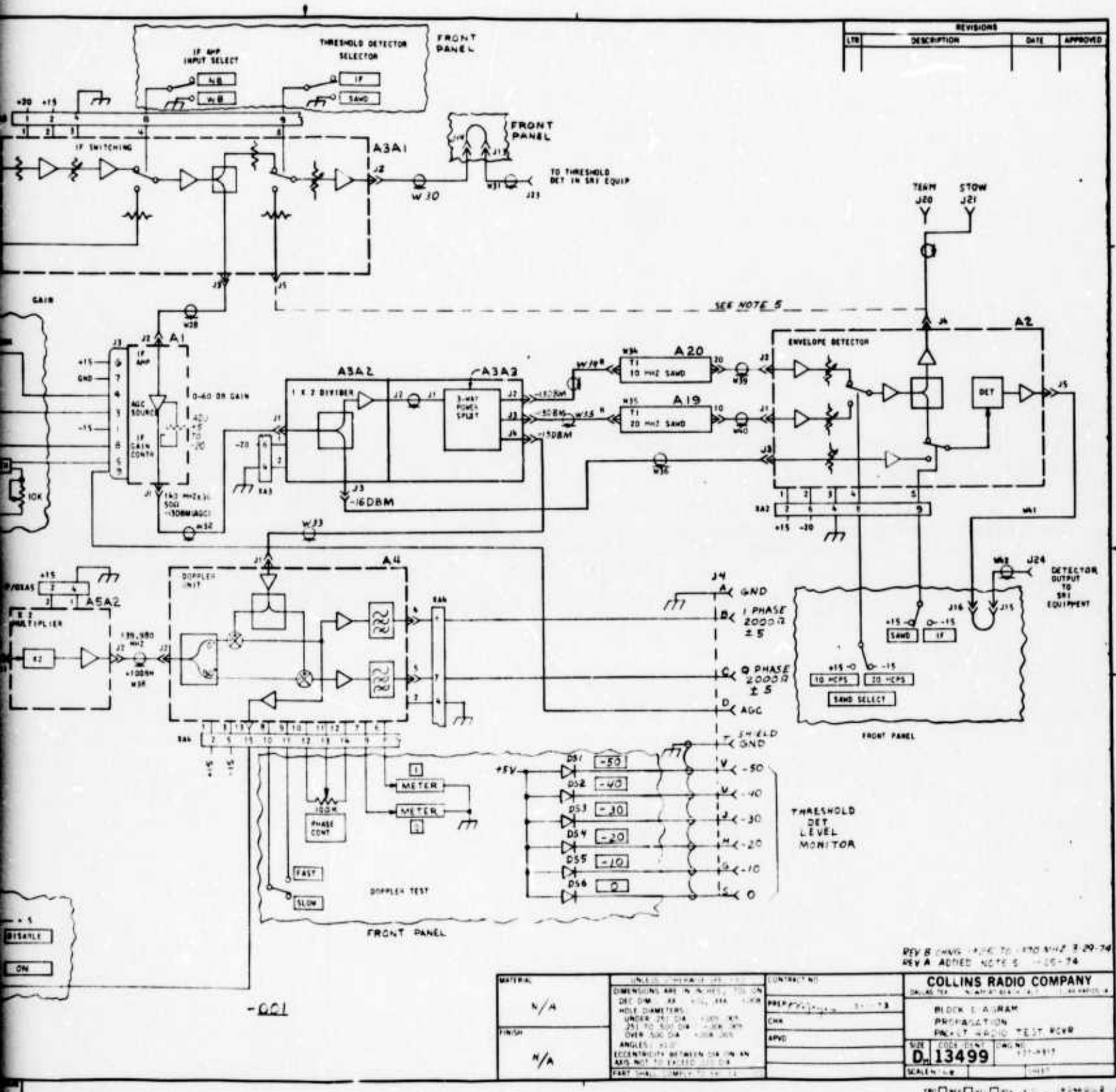
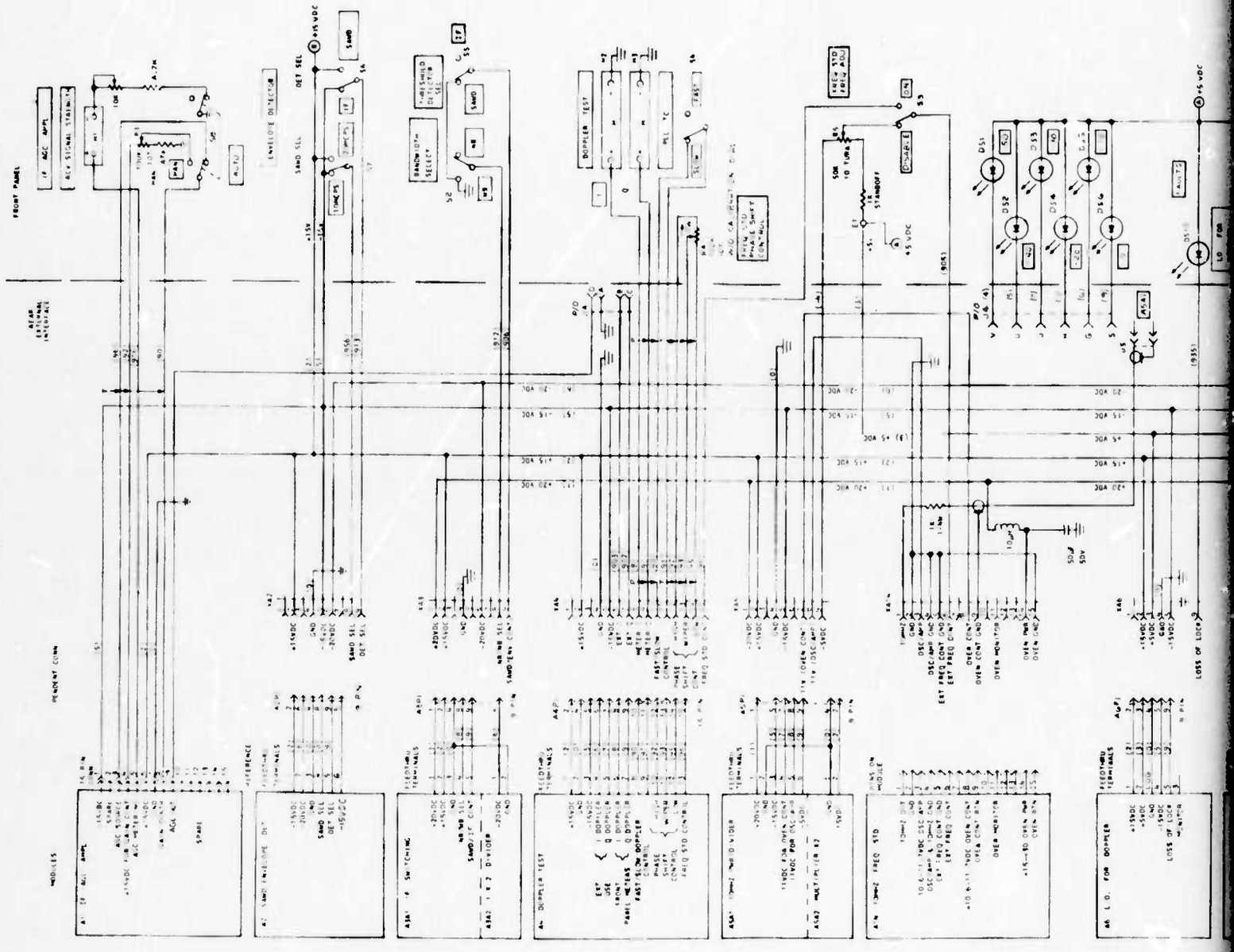

FRONT PANEL
IF AMP INPUT SELECT
THRESHOLD DETECTOR SELECTOR
A9A1
A13
A3A1
IF SWITCHING
TO THRESHOLD DET IN SRI EQUIP
SEE NOTE
GAIN
A1
A3A2
A3A3
A20
A19
A4
A6
A5A2
A5A1
DOPPLER TEST
FREQ CONTROL
FRONT PANEL
-021
N/A
B


REVISIONS
LTR
DESCRIPTION
DATE
APPROVED
FRONT PANEL
IF AMP INPUT SELECT
THRESHOLD DETECTOR SELECTOR
FRONT PANEL
A3A1
IF SWITCHING
TO THRESHOLD DET IN SRI EQUIP
TEAM J20
STOW J21
SEE NOTE 5
A2
ENVELOPE DETECTOR
A20
A19
10 MHZ SAWD
20 MHZ SAWD
A3A2
1 X 2 DIVIDER
A3A3
3-WAY POWER SPLIT
A1
IF AMP
AGC SOURCE
IF GAIN CONTR
0-40 DB GAIN
-16DBM
A4
DOPPLER UNIT
A5A2
X 2 MULTIPLIER
J4
A GND
B 1 PHASE 2000Ω ±5
C Q PHASE 2000Ω ±5
D AGC
T SHIELD GND
V -50
U -40
J -30
H -20
G -10
E 0
DETECTOR OUTPUT TO SRI EQUIPMENT
10 MCPS
20 MCPS
SAWD SELECT
FRONT PANEL
METER
METER
PHASE CONT
FAST
SLOW
DOPPLER TEST
FRONT PANEL
DS1 -50
DS2 -40
DS3 -30
DS4 -20
DS5 -10
DS6 0
THRESHOLD DET LEVEL MONITOR
DISABLE
ON
REV B CHNG NOTE TO 1750 MHZ 3-29-74
REV A ADDED NOTE 5 5-15-74
MATERIAL N/A
FINISH N/A
CONTRACT NO
PREP
CHK
APVD
COLLINS RADIO COMPANY
BLOCK DIAGRAM
PROPAGATION
PACKET RADIO TEST RCVR
SIZE D
CODE IDENT 13499
DRAWING
SCALE NONE
SHEET
-001

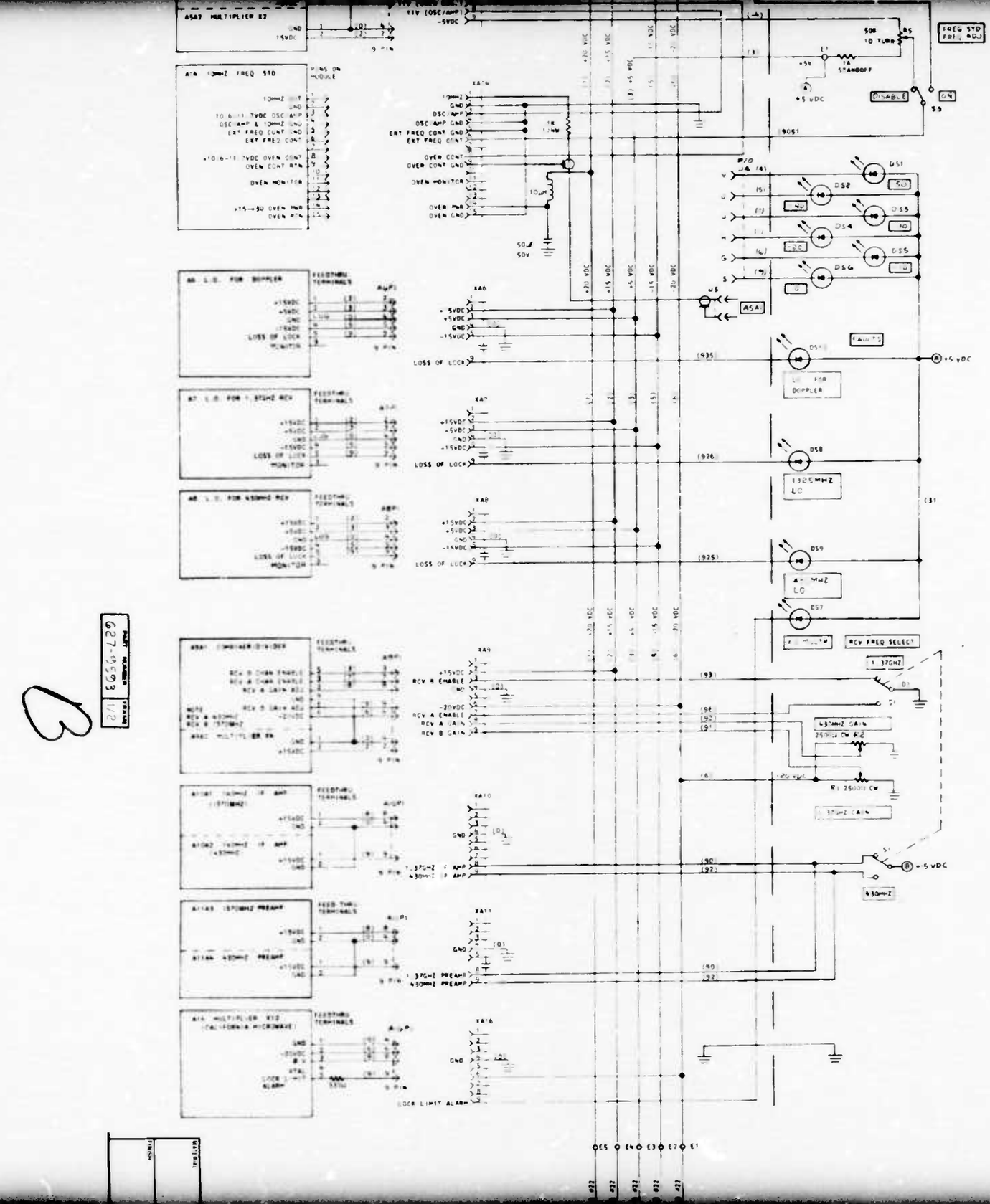
B

C



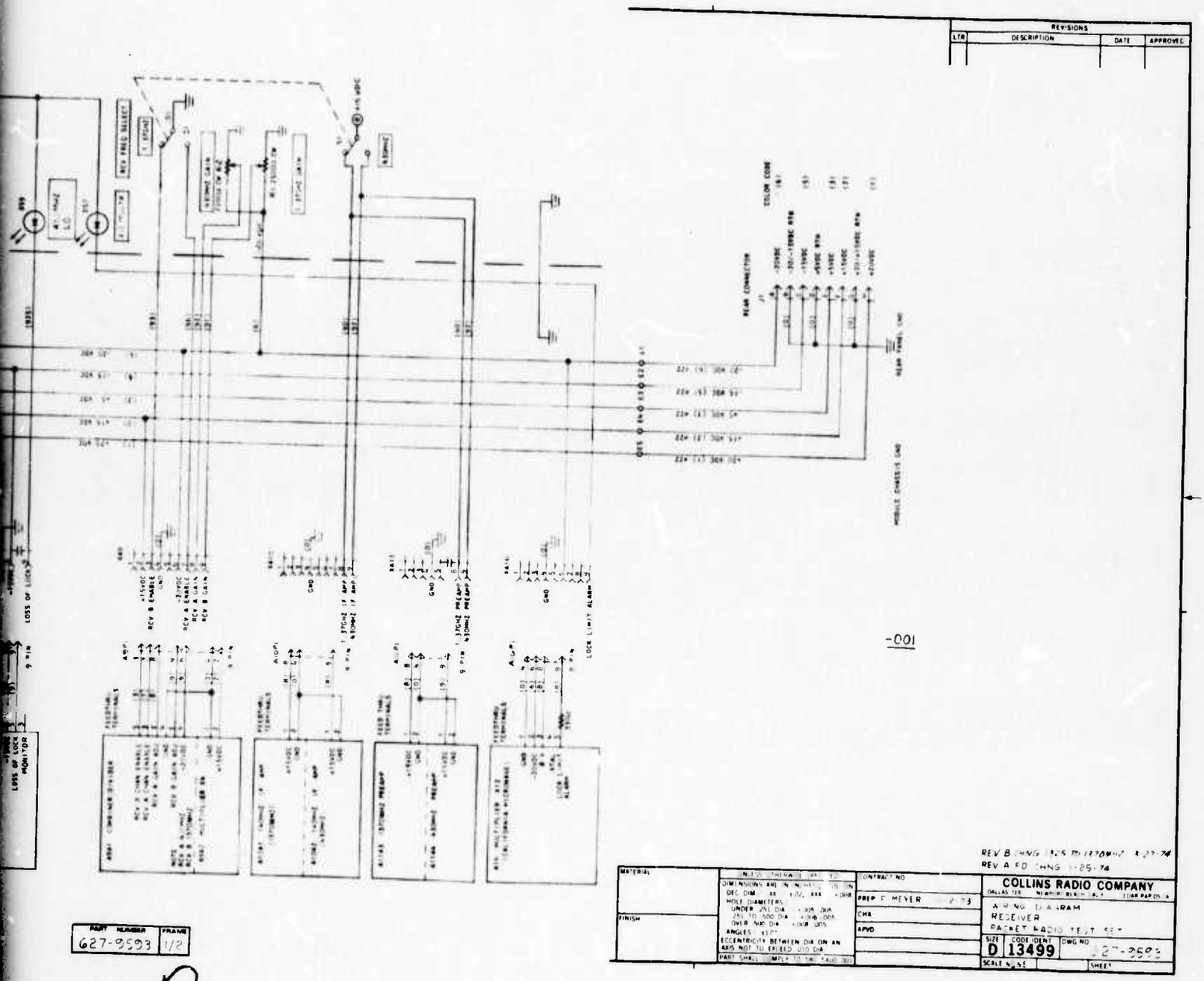
PART NUMBER	FRAME
627-9593	1/2

A



B

PART NUMBER 627-9503 FRAME 1/2


REVISIONS
LTR
DESCRIPTION
DATE
APPROVED
REAR CONNECTION
COLOR CODE
REAR PANEL GND
MODULE CHASSIS GND
LOSS OF LOCK
LOSS OF LOCK MONITOR
RCV B ENABLE
RCV A ENABLE
RCV A GAIN
RCV B GAIN
GND
LOCK LIMIT ALARM
-001
REV B CHNG R/S TO 1270MHZ R 2-7-74
REV A ED CHNG 1-25-74
COLLINS RADIO COMPANY
DALLAS, TEX.
WIRING DIAGRAM
RECEIVER
PACKET RADIO TEST SET
SIZE D
CODE IDENT 13499
DWG NO 627-9593
SCALE NONE
SHEET
CONTRACT NO
PREP F MEYER 2-7-73
CHK
APVD
MATERIAL
FINISH
PART NUMBER 627-9593
FRAME 1/2

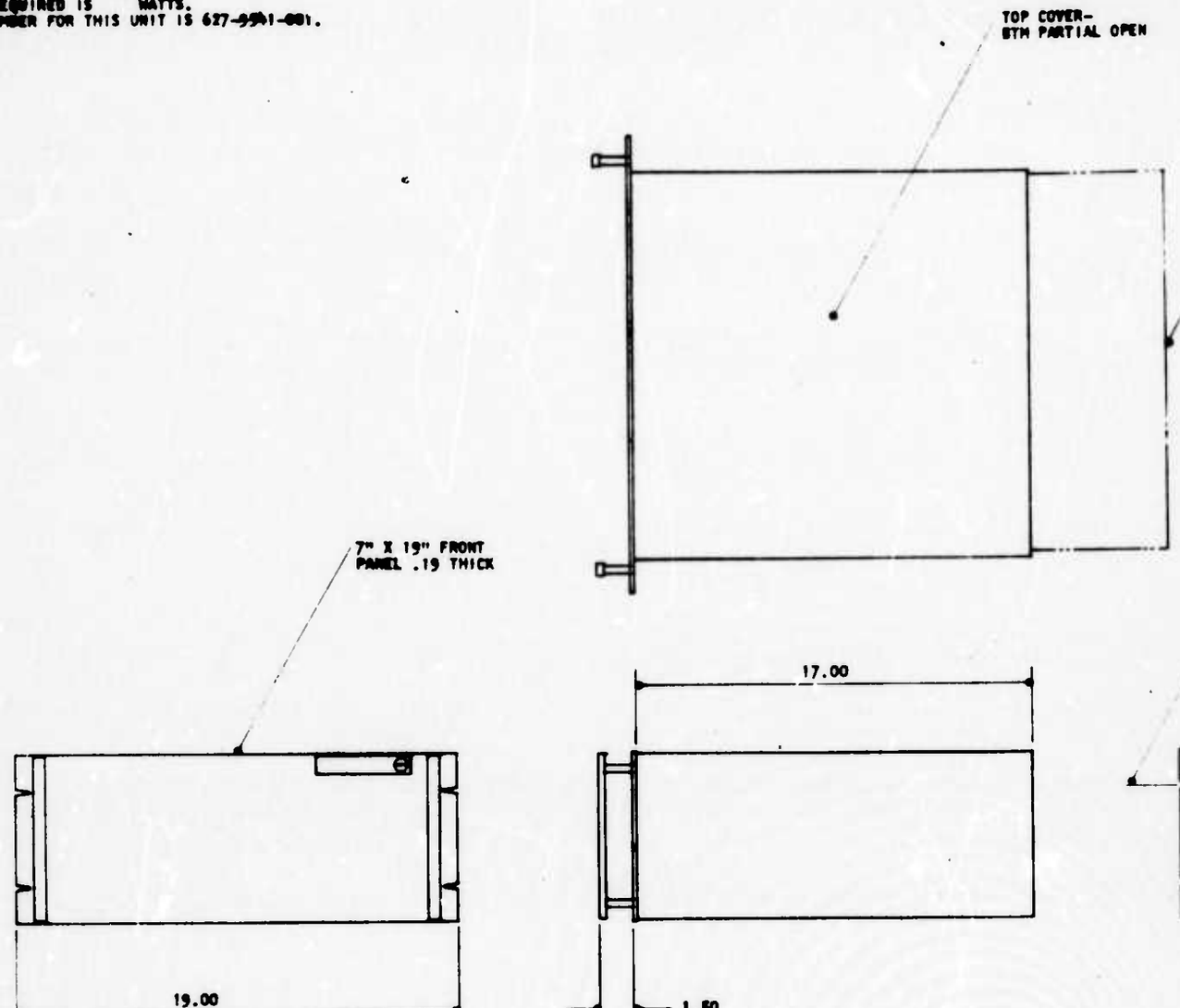
B

C

NOTES:

1. UNIT WEIGHT IS 30 POUNDS.
2. POWER REQUIRED IS WATTS.
3. PART NUMBER FOR THIS UNIT IS 627-9501-001.

LTR



QTY	ITEM NO.	PART OR IDENTIFYING NO.	NAME
	DASH NO.		PA

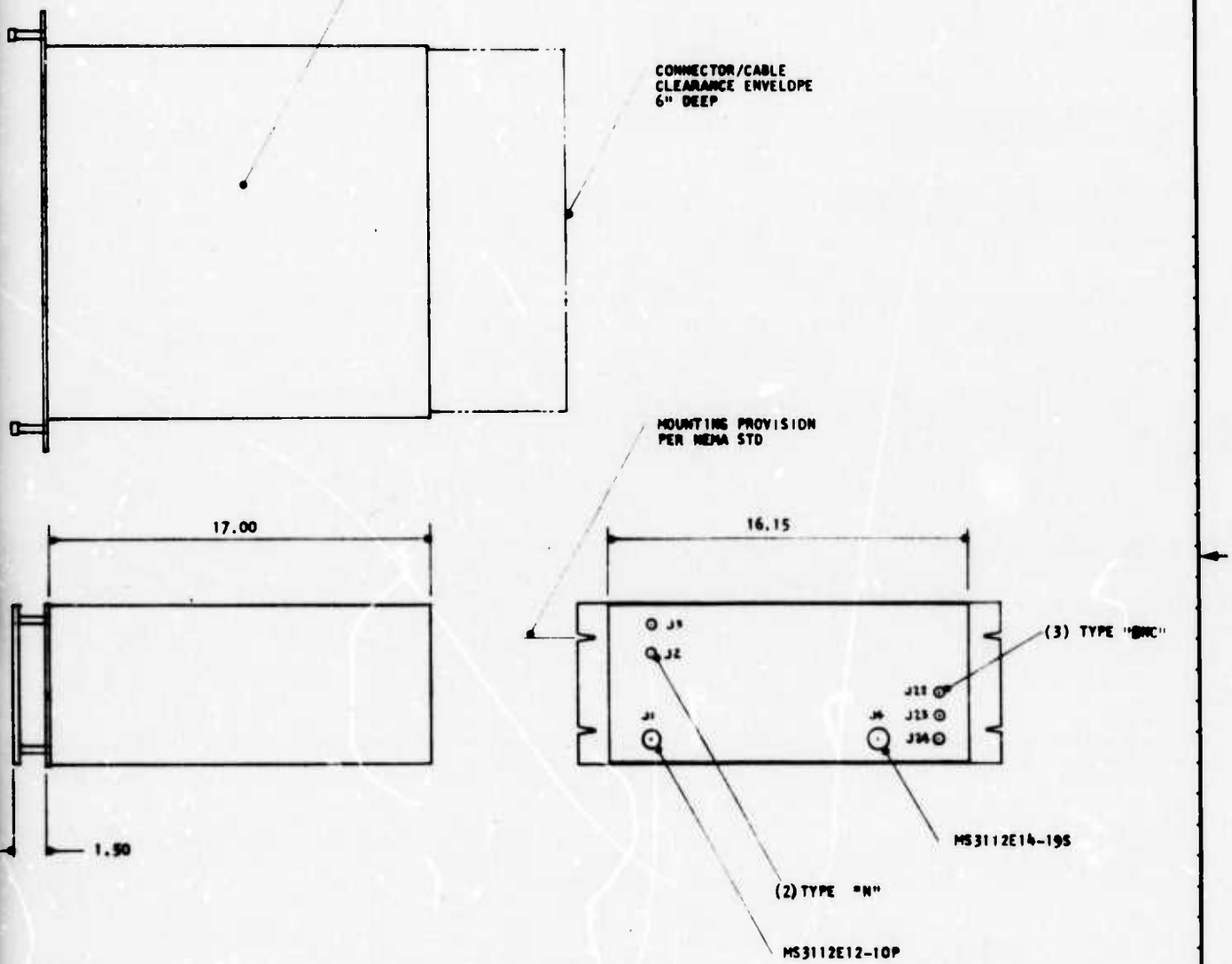
MATERIAL: N/A	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES; TOL ON DEC DIM.: XX = ±.02, XXX = ±.008 HOLE DIAMETERS: UNDER .251 DIA = +.005-.005 .251 TO .500 DIA = +.006-.005 OVER .500 DIA = +.008-.005 ANGLES: ±1.0° ECCENTRICITY BETWEEN DIA ON AN AXIS NOT TO EXCEED .010 DIA PART SHALL COMPLY TO 580-5400-001	CONTRACT NO. PREP D. DELFELD 11/ CHK APVD R A Herrick
FINISH: N/A		

627-9501-000

NEXT ASSY: TYPE NO:

A

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED

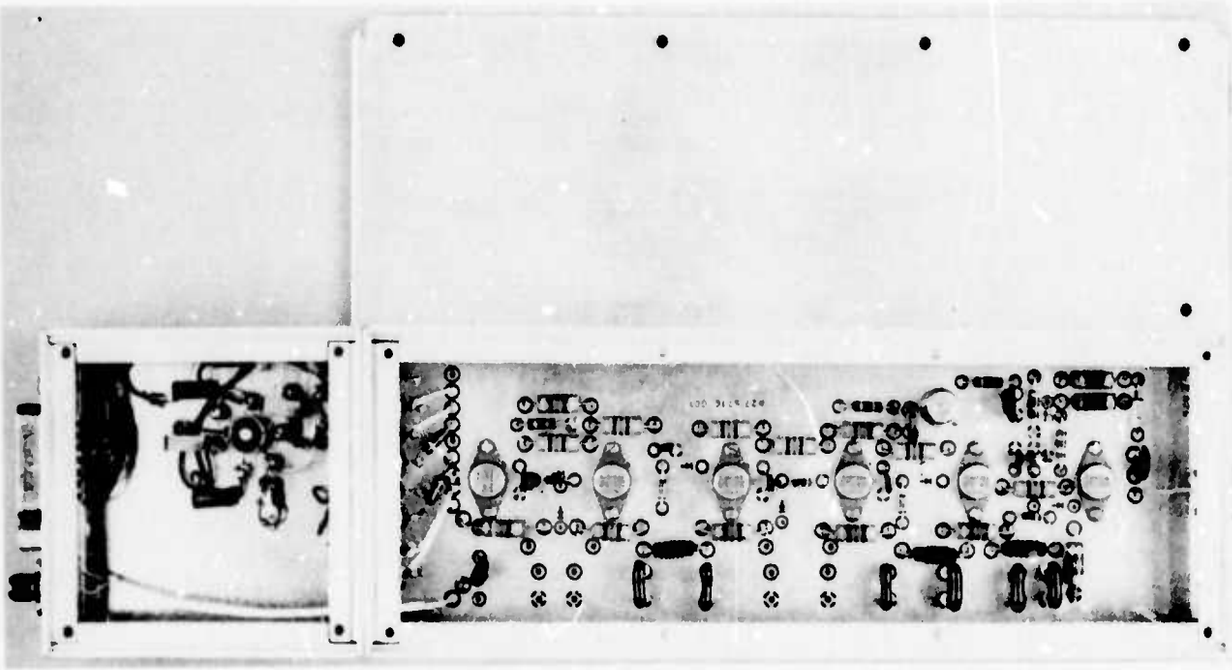


QTY	ITEM NO.	PART OR IDENTIFYING NO.	NAME	DESCRIPTION	UNI	MFR	ALTN PREF
	DASH NO.		PARTS LIST				

MATERIAL N/A FINISH N/A	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES; TOL ON DEC DIM.: .XX = ±.02, .XXX = ±.008 HOLE DIAMETERS: UNDER .251 DIA = +.006-.005 .251 TO .500 DIA = +.008-.005 OVER .500 DIA = +.008-.005 ANGLES: ±1.0° ECCENTRICITY BETWEEN DIA ON AN AXIS NOT TO EXCEED .01D DIA PART SHALL COMPLY TO 580-5400-001	CONTRACT NO. PREP D. DELFELD 11/19/73 CHK APVD R A Herrick	COLLINS RADIO COMPANY DALLAS, TEX NEWPORT BEACH, CALIF CEDAR RAPIDS, IA RECEIVER- OUTLINE & INSTALLATION, PACKET RADIO TEST SET SIZE C · CODE IDENT 13499 · DWG NO 627-9576 SCALE 1/4 · SHEET

FRO ☐ NFP ☐ REL ☐ REV__ TC__ CR0 NB 0 DL 2 TO 0

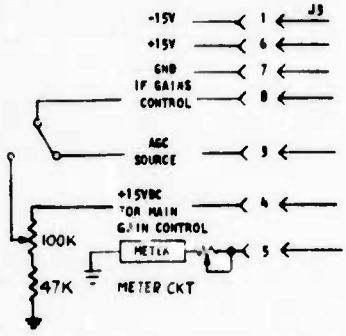
B



A1 - IF AGC AMPL.

NOTES:

NOTES:
1. TYP CONNECTION



2. GPD 401/402 BOTTOM VIEW

1. +15VDC
2. RF INPUT
3. GND
4. RF OUTPUT

	401	402	UNITS
FREQ. RANGE	5-400	5-400	MHz
GAIN	13	13	DB
N.F.	4.5	6	DB
OUTPUT FOR 1 DB GAIN COMPRESSION	-2	+6	DBM

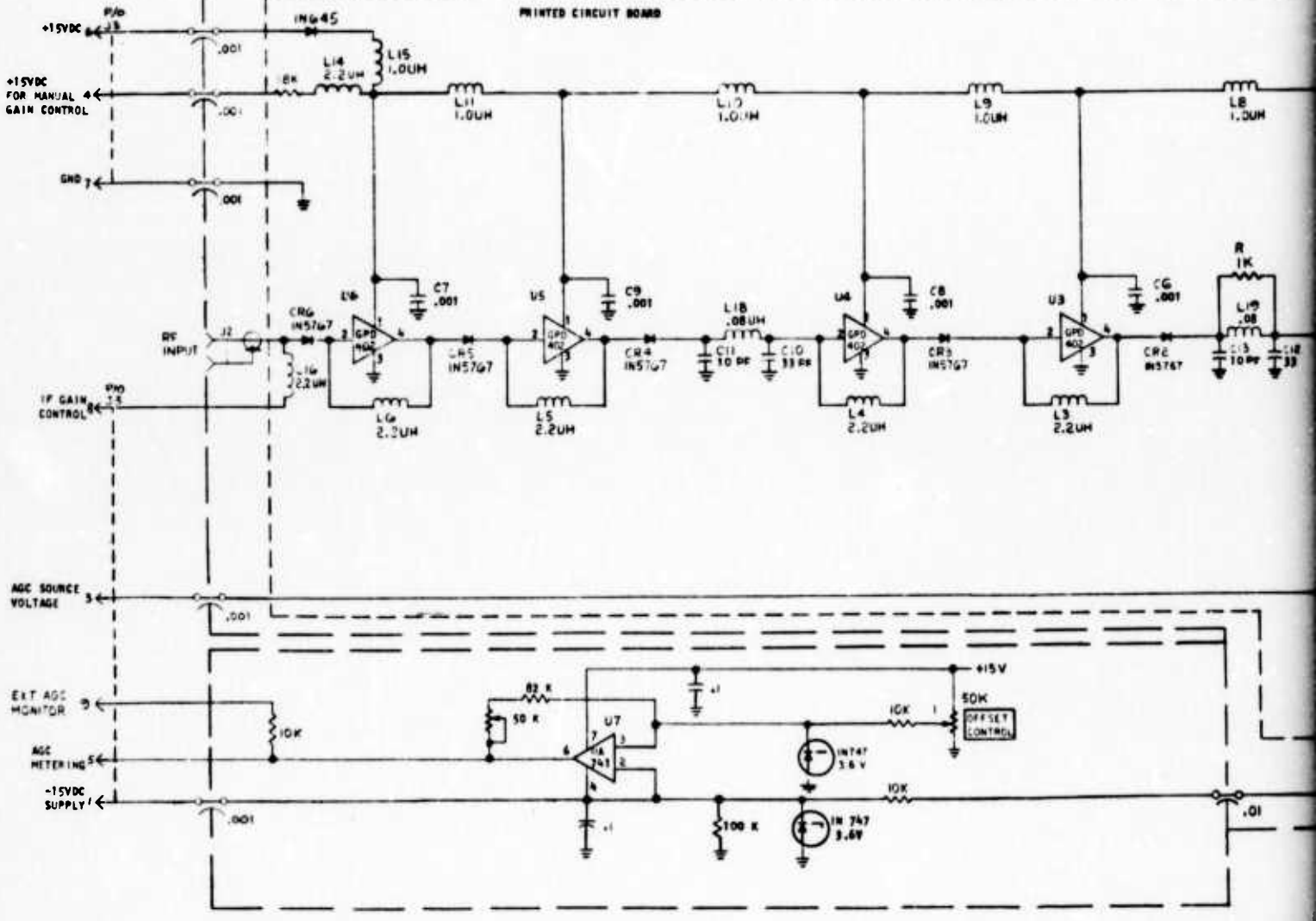
3. U6741 OP AMP BOTTOM VIEW

PIN
1. OFFSET NULL
2. INVERTING INPUT
3. NON INVERTING INPUT
4. -15V
5. OFFSET NULL
6. OUTPUT
7. +15V
8. N.C.

4. UNLESS OTHERWISE
ALL RESISTANCE VA
ALL RESISTORS ARE
ALL CAPACITANCE V

5. INPUT TO OUTPUT

PRINTED CIRCUIT BOARD



-001

NEXT ASSY

TYPE NO

A

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED

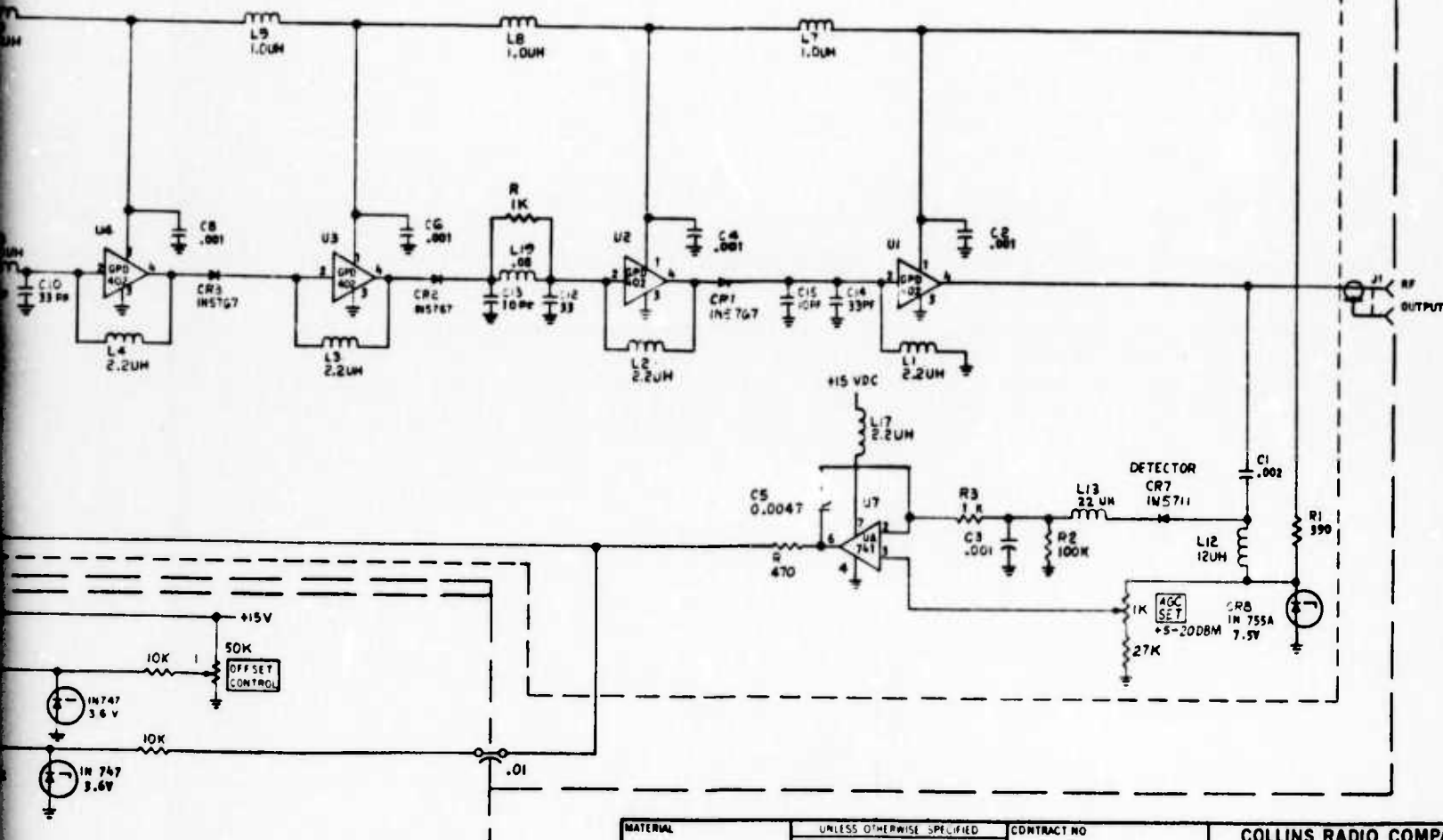
402	UNITS
5-400	MHz
13	DB
6	DB
+6	DBM

3. UA741 OP AMP
BOTTOM VIEW

PIN
1. OFFSET NULL
2. INVERTING INPUT
3. NON INVERTING INPUT
4. -15V
5. OFFSET NULL
6. OUTPUT
7. +15V
8. N.C.

4. UNLESS OTHERWISE SPECIFIED:
ALL RESISTANCE VALUES ARE IN OHMS
ALL RESISTORS ARE 1/4W 10%
ALL CAPACITANCE VALUES ARE IN MICROFARADS

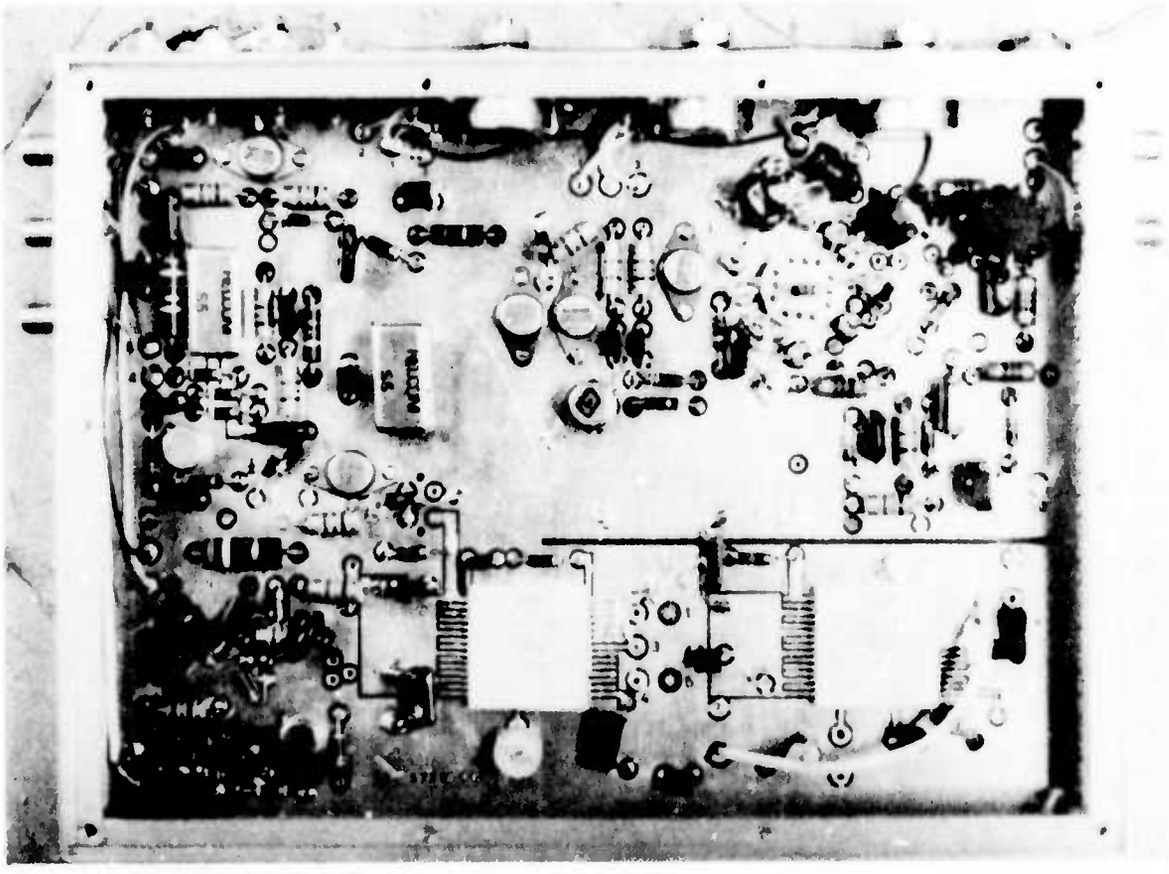
5. INPUT TO OUTPUT DELAY ≈ 20NSEC



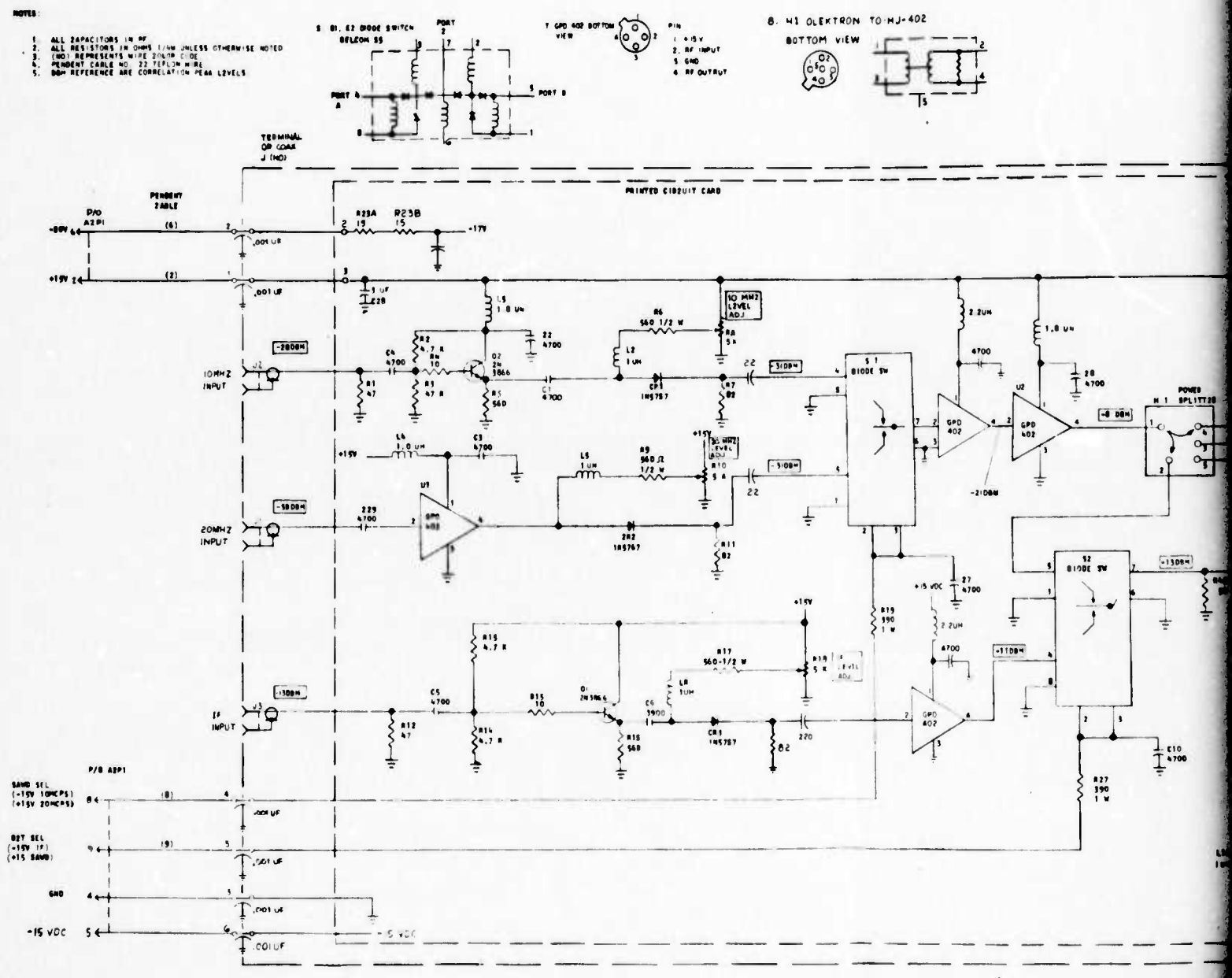
-001

MATERIAL	UNLESS OTHERWISE SPECIFIED	CONTRACT NO	COLLINS RADIO COMPANY
FINISH	DIMENSIONS ARE IN INCHES; TOL ON DEC DIM: .XX = ±.02, .XXX = ±.008 HOLE DIAMETERS: UNDER .251 DIA = +.005 -.005 .251 TO .500 DIA = +.006 .005 OVER .500 DIA = +.008 -.005 ANGLES: ±1.0° ECCENTRICITY BETWEEN DIA ON AN AXIS NOT TO EXCEED .010 DIA PART SHALL COMPLY TO SMS 5400 001	PREP D. NETHERLAND 10-27-3 CHK APVD	DALLAS TEX NEWPORT BEACH CALIF CEDAR RAPIDS, IA SCHEMATIC DIAGRAM A1 IF AGC AMPLIFIER PACKET RADIO TEST RCVR
			SIZE D · CODE IDENT 13499 · DWG NO 627-9404 SCALE · SHEET

B

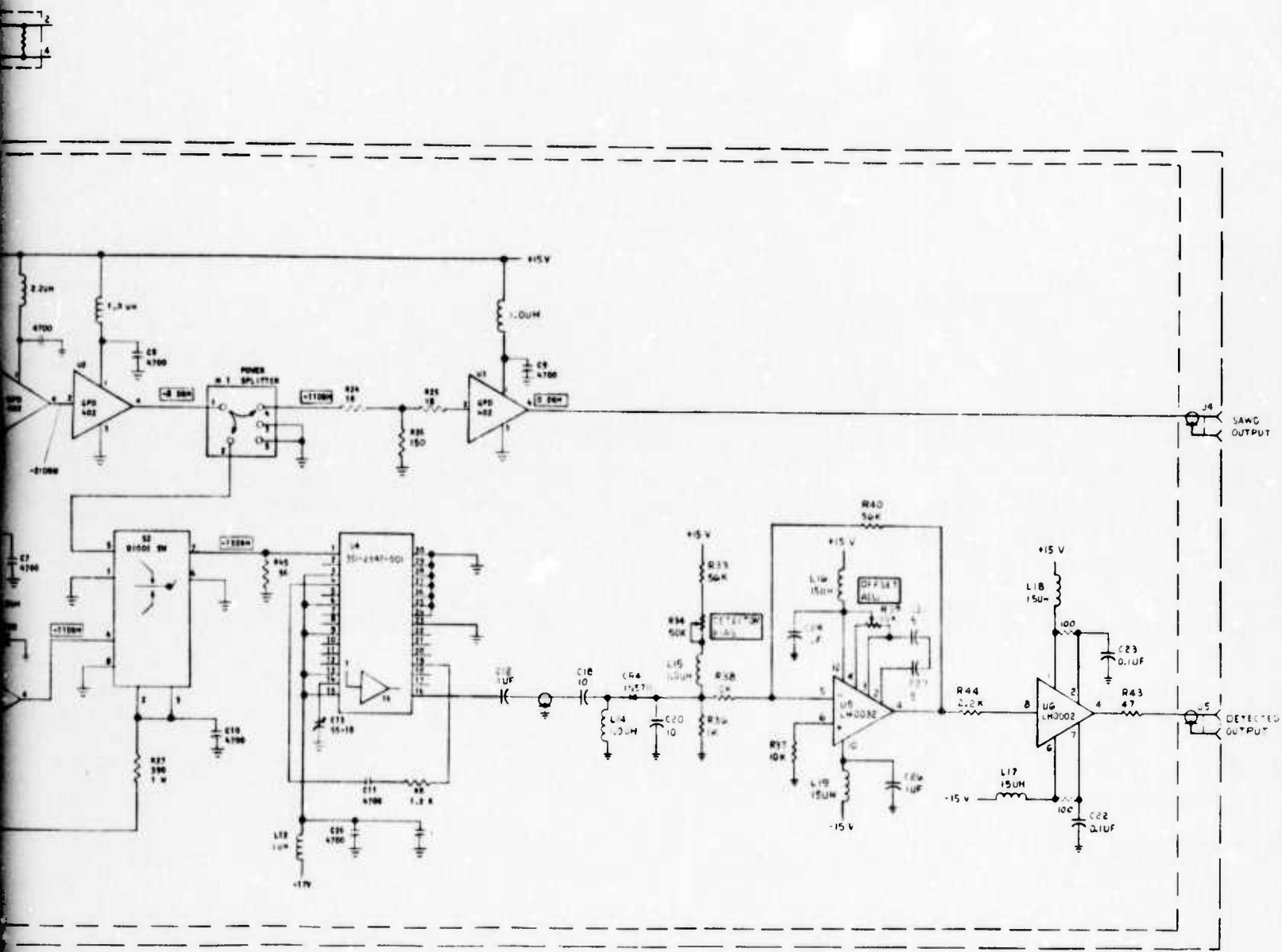


A2 - SAWD/IF ENV DET



PART NUMBER	FRAME
627-9405	2/2

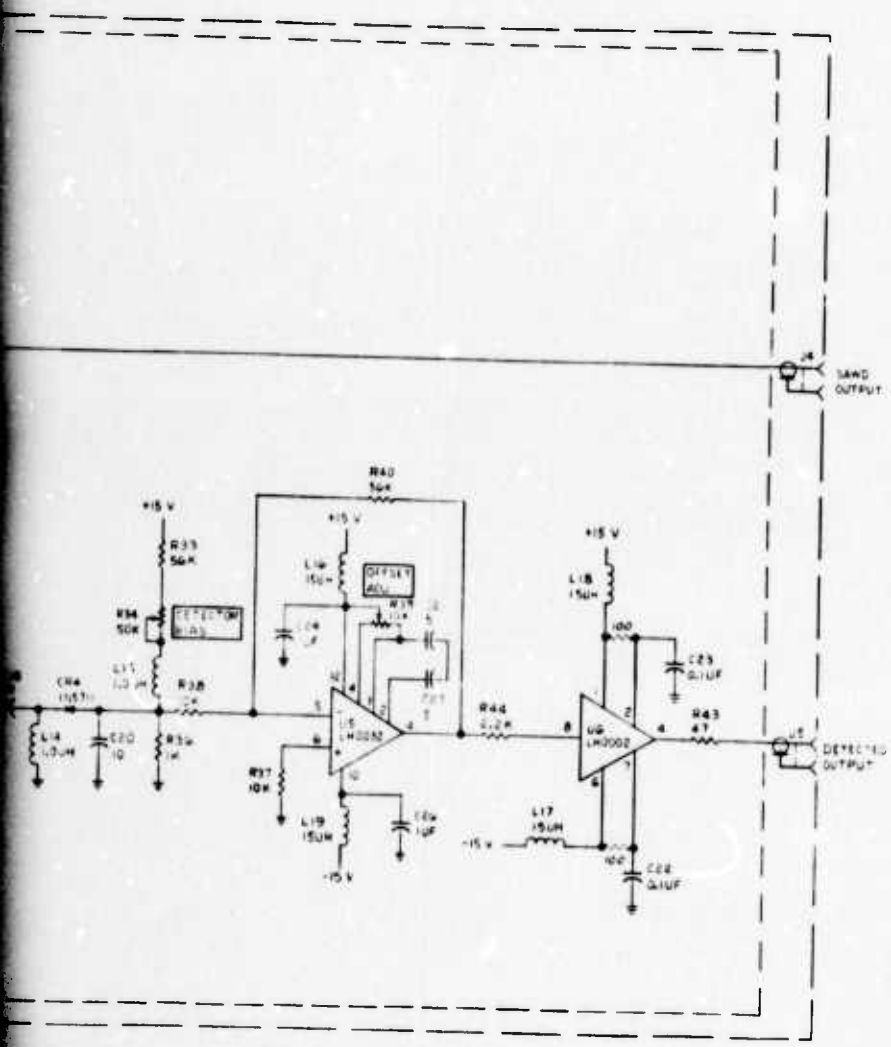
A



PART NUMBER	FRAME
627-9405	C

B

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED



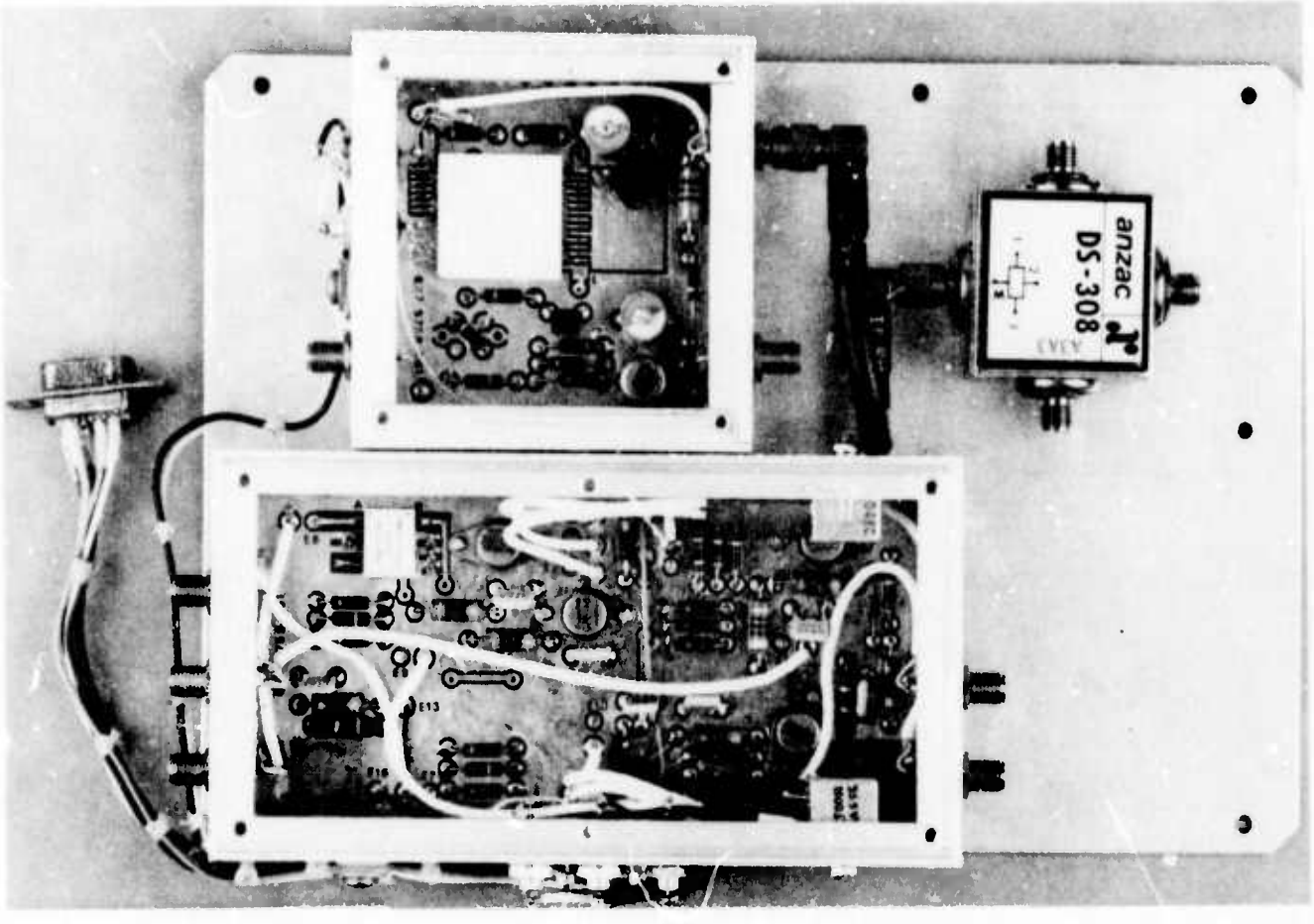
-001

CONTRACT NO.	COLLINS RADIO COMPANY DALLAS, TEX. NEWPORT BEACH, CALIF. CEDAR RAPIDS, IA.
PREP'D NETHERLAND 4-73	WIRING DIAGRAM AZ SHAPING ENVELOP DET AND VIDEO PC/A
CHK	
APV'D	
	SIZE: CODE IDENT 13499 DWG NO. 627-3405
	SCALE: SHEET

PROD ☐ RFP ☐ REL ☐ REV__ TC__ ✕ CR'S NO'S DL'S TO__

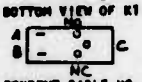
B

C

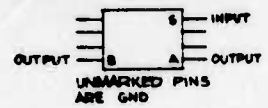


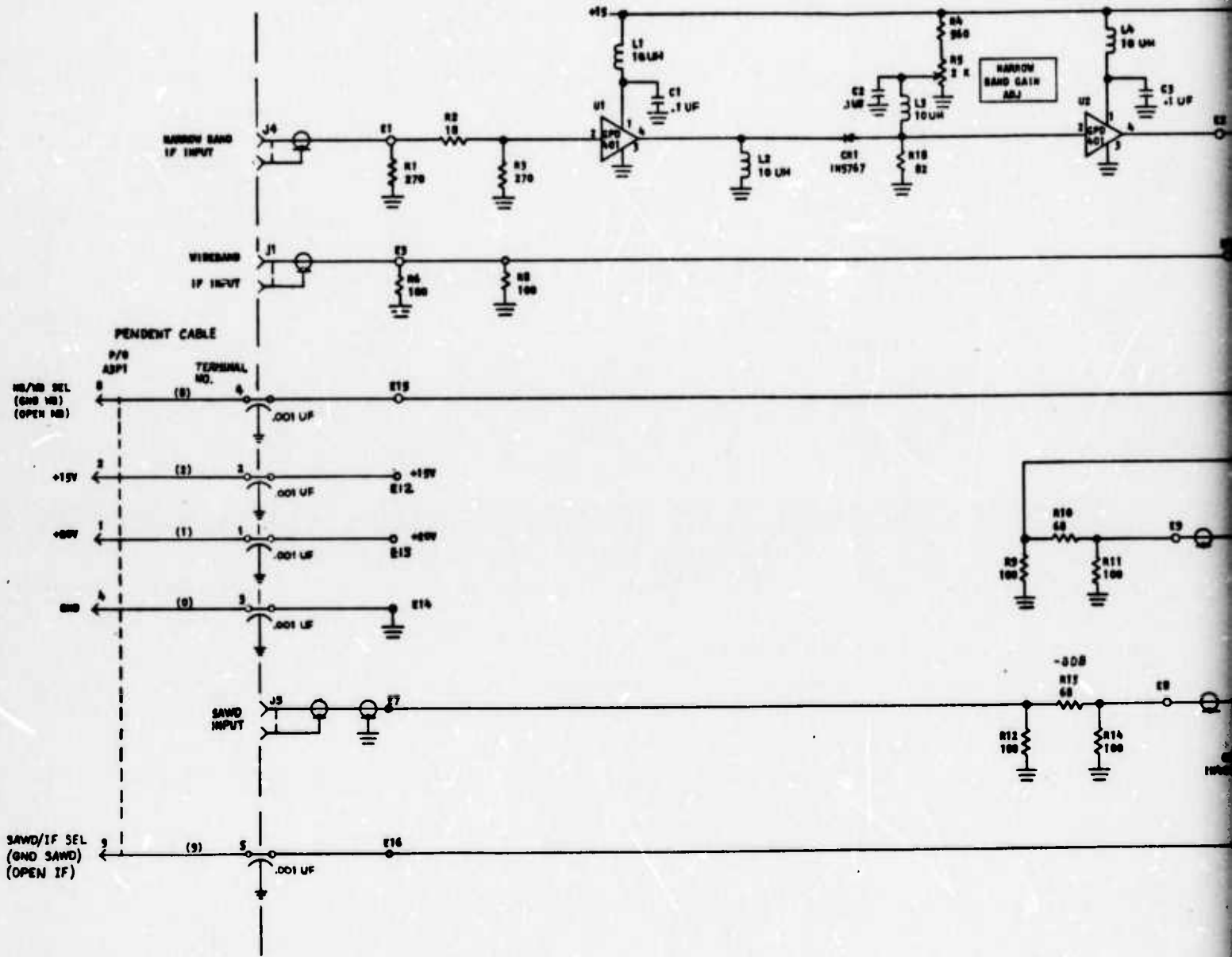
A3( )

NOTES:

1. NARROWBAND INPUT 2000 BELOW WIDEBAND INPUT
   NB FILTER LOSS 90B
   $10 \log \frac{40\ MHz\ BW}{.9\ MHz\ BW} = 1900$
2. BOTTOM VIEW OF K1 AND K2
   

3. PENDENT CABLE NO. 22 TEFLON WIRE () INDICATES COLOR CODE
4. P1 IS A COMMON POWER/SIGNAL PLUG FOR A3 A1 AND A3 A2.
5. 6PD 402 BOTTOM VIEW
   

6. POWER SPLITTER LORCH PS 260 TOP VIEW
   

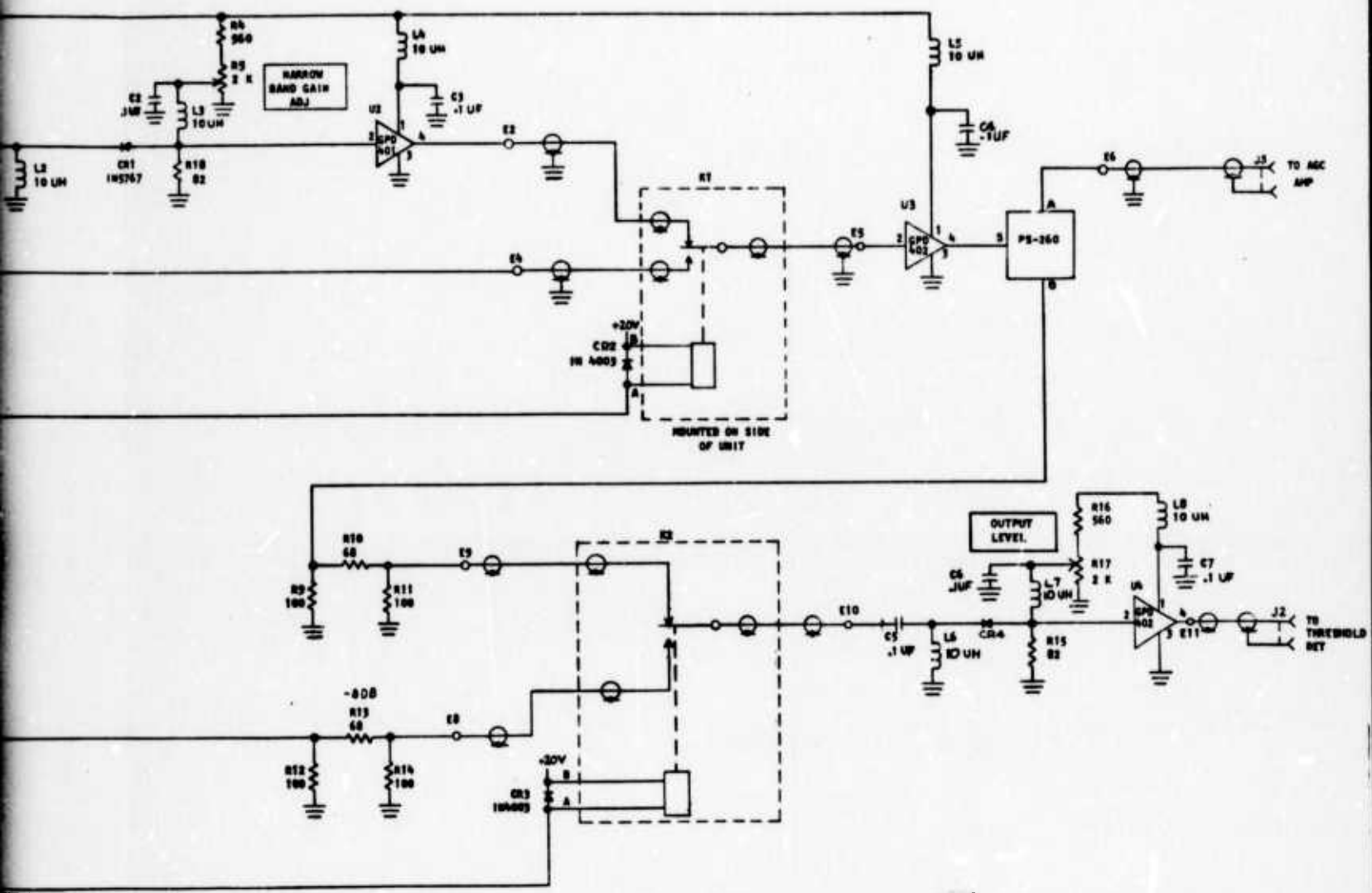


NEXT ASSY:

TYPE NO:

A

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED

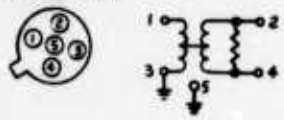


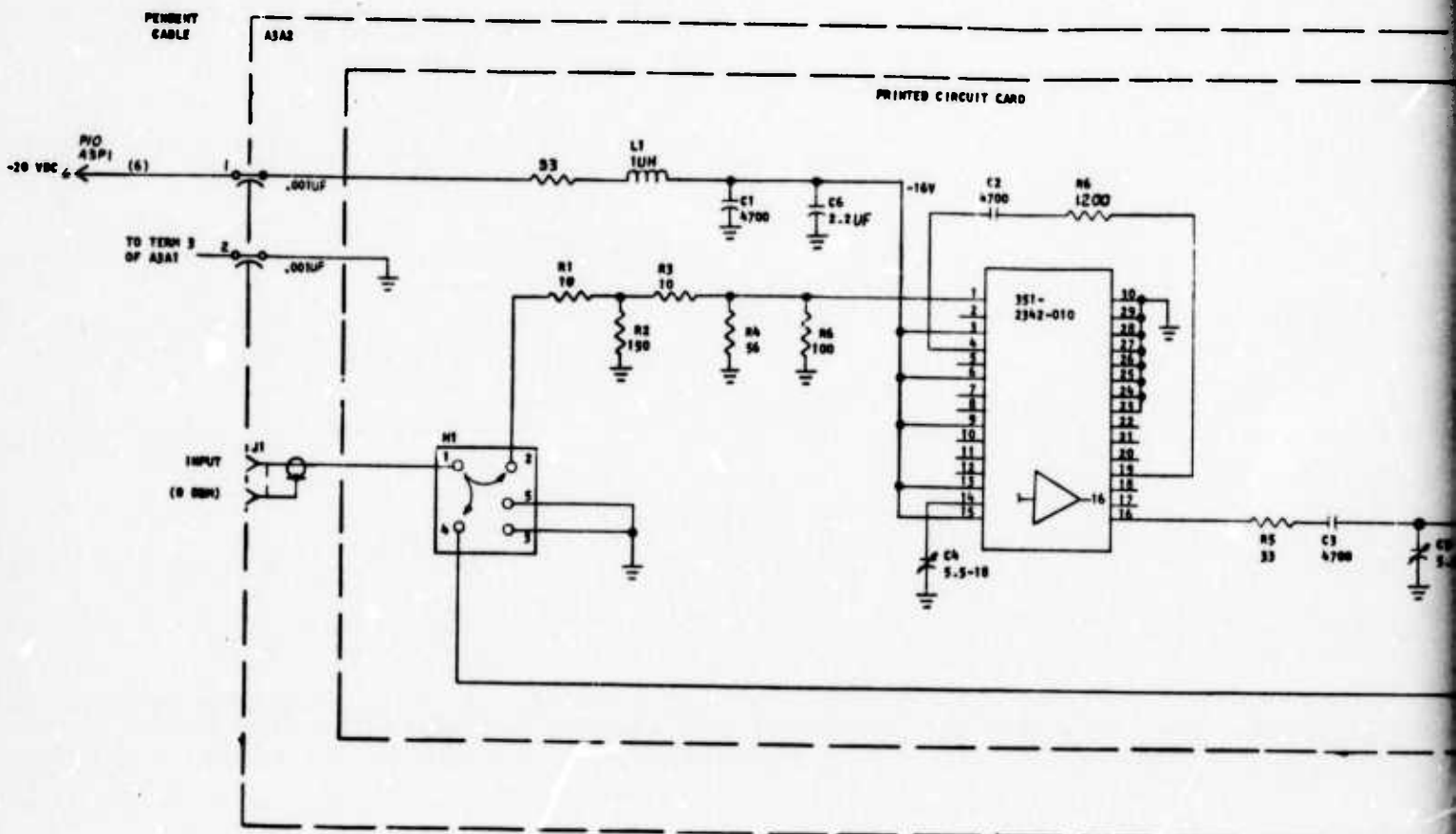
-001

MATERIAL	UNLESS OTHERWISE SPECIFIED	CONTRACT NO	COLLINS RADIO COMPANY
	DIMENSIONS ARE IN INCHES; TOL ON DEC DIM.: XX = ±.02, XXX = ±.008	PREP D. NETHERLAND 10-11-73	DALLAS TEX NEWPORT BEACH CALIF CEDAR RAPIDS IA
FINISH	HOLE DIAMETERS: UNDER .251 DIA = +.005 -.005; .251 TO .500 DIA = +.006 -.005; OVER .500 DIA = +.008 -.005	CHK	SCHEMATIC DIAGRAM A3A1 IF SWITCH PACKET RADIO TEST RCVR
	ANGLES: ±1.0°	APVD	SIZE D | CODE IDENT 13499 | DWG NO 627-9406
	ECCENTRICITY BETWEEN DIA ON AN AXIS NOT TO EXCEED .010 DIA		SCALE NONE | SHEET
	PART SHALL COMPLY TO MIL-STD-[illegible]-001		

B

NOTES:
1. A3A2/A3A3 MOUNTED WITH A3A1
2. PENDENT CABLE IS 22 TEFLON WIRE OF COLOR CODE NOTED IN ()
3. UNLESS OTHERWISE SPECIFIED
   ALL RESISTANCE VALUES ARE IN OHMS (1/4W, 10%)
   ALL CAPACITANCE VALUES ARE IN PICOFARADS
4. H1 OLEKTRON TO-HJ-402-VS DIVIDER
   BOTTOM VIEW

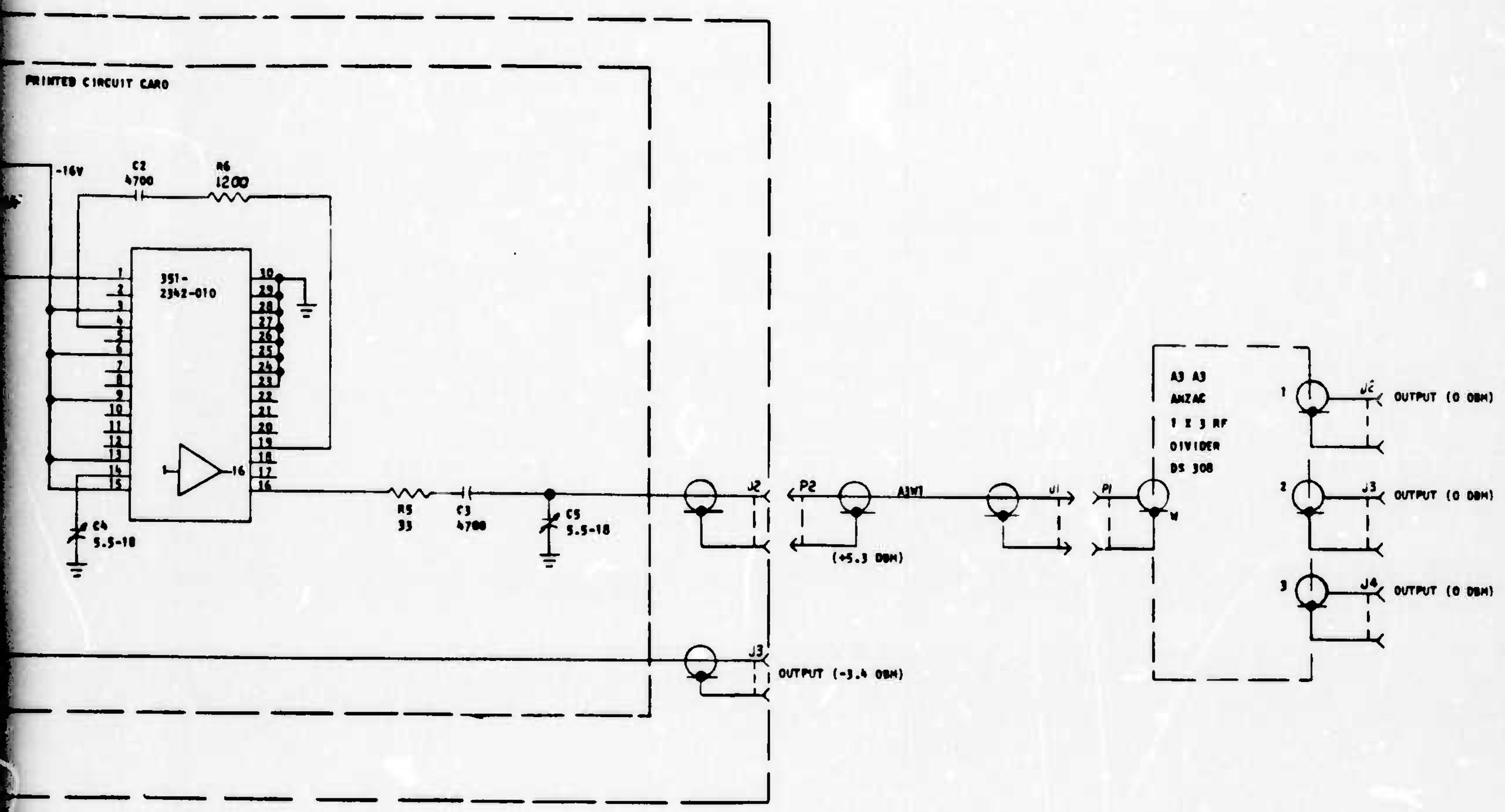




NEXT ASSY: TYPE NO:

A

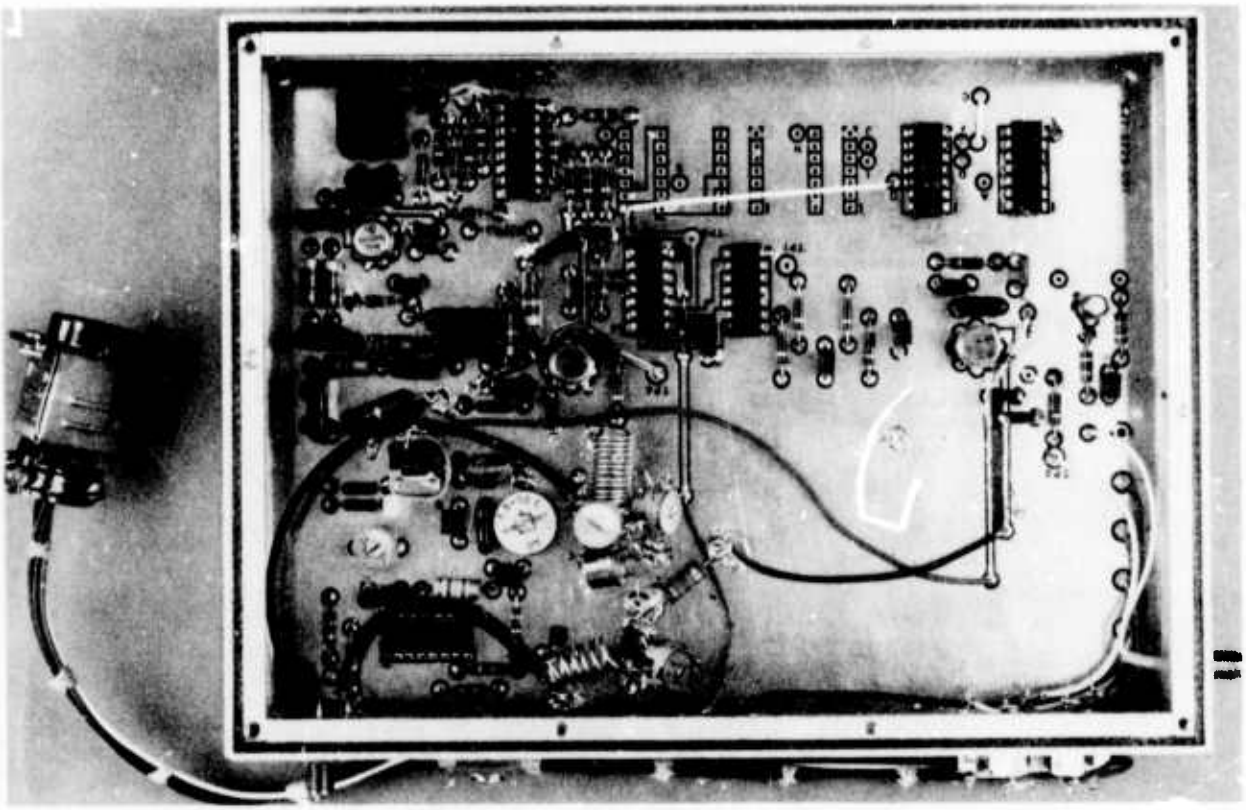
REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED



-001

MATERIAL	UNLESS OTHERWISE SPECIFIED	CONTRACT NO	COLLINS RADIO COMPANY
	DIMENSIONS ARE IN INCHES; TOL ON DEC DIM.: .XX = ±.02, .XXX = ±.008 HOLE DIAMETERS: UNDER .251 DIA = +.005-.005 .251 TO .500 DIA = +.006-.005 OVER .500 DIA = +.008-.005 ANGLES: ±1.0° ECCENTRICITY BETWEEN DIA ON AN AXIS NOT TO EXCEED .010 DIA	PREP [illegible signature] 10-22-75	DALLAS TEX NEWPORT BEACH CALIF CEDAR RAPIDS IA
FINISH		CHK	SCHEMATIC DIAGRAM A3A2/A3A3 1 X 4 RF DIVIDER PACKET RADIO TEST RCVR
		APVD	SIZE D CODE IDENT 13499 DWG NO 527-9407
	PART SHALL COMPLY TO 580 5400 001		SCALE NONE SHEET

B



A4 - DOPPLER

NOTES:

1. LORCH PS260-FF SHOWN PHYSICALLY ON SCHEMATIC AS VIEWED FROM THE TOP.
2. RELCOM MSO SHOWN PHYSICALLY ON SCHEMATIC AS VIEWED FROM THE BOTTOM.
3. ANAREN 10263-3 SHOWN PHYSICALLY ON SCHEMATIC AS VIEWED FROM THE TOP.
4. PENDENT CABLE IS NO. 22 TEFLON WIRE WITH COLOR CODE MARKED IN ()
5. TYPICAL CONNECTIONS(XAA)
   +15V 2
   GND 4
   -15V 5
   FAST SLOW DOPPLER 10 11
   PHASE CONTROL HIGH 12, WIPER 13, LOW 14 — 100K
   I METERING 8 — 0±5V
   Q METERING 9 — 0±5V
6. LM101 BOTTOM VIEW
   PIN 1 BALANCE
   2 INVERTING INPUT
   3 NONINVERTING INPUT
   4 -15V
   5 BALANCE
   6 OUTPUT
   7 +15V
   8 FREQ. COMPENSATION
7. UNLESS OTHERWISE SPECIFIED ALL CAPACITOR VALUES ARE IN MICROFARADS
   ALL RESISTANCE VALUES ARE IN OHMS.

P/O A4P1 PENDENT CABLE TERMINAL NO.

+15V (2) 1 — 1000 pF — +15V
GND (0) 2 — 1000 pF
-15V (5) 3 — 1000 pF — -15V

PHASE ADJ C51 2-8PF

U4 RELCOM MSO MIXER

U1 GPD 402 — 40B PAD — R52 24 — R51 220 R53 220 — J1 REF NB 140 MHZ INPUT — -13DBM ±1

U2 LORCH PS-260-FF

U3 RELCOM MSO MIXER

U5 ANAREN 10262-3 — 0° PHASE — -90° PHASE — J2 140 MHZ FROM FREQ STD — 0DBM ±1 — R3 47

C1 .001 — C16 2700 — C17 470 — C5 470 — C6 2700 — C3 .001 — C18 .02 — C4 .02

R17 82.5K — R2 1K — R4 82.5K — R14 10K — R15 100K — R1 1K — C2 .001 — R11 100K — R12 10K — R13 100K — C10 .022

U6 LM101A — R19 19.6 K — C19 .020 — C20 .020 — C21 33PF — R18 1M — R20 82.5K — R21 1.00M — +15 VDC

U8 LM101A — R6 19.6K — C7 .020 — C8 .020 — C9 33PF — R9 82.5K — R10 1.00 M — +15 VDC

U7 LM101A — C15 33PF

P/O A4P1

FAST/SLOW DOPPLER: 10 (10) 8 — 1000 PF; 11 (11) 9 — 1000 PF

PHASE CONTROL: 12 (12) 10 — 1000 PF; 13 (13) 11 — 1000 PF; 14 (14) 12 — 1000 PF

R24 3.3M — R54 2.2M — C22 0.1 — C14 0.1 — R25 3.3M — R55 2.2M — C23 0.1

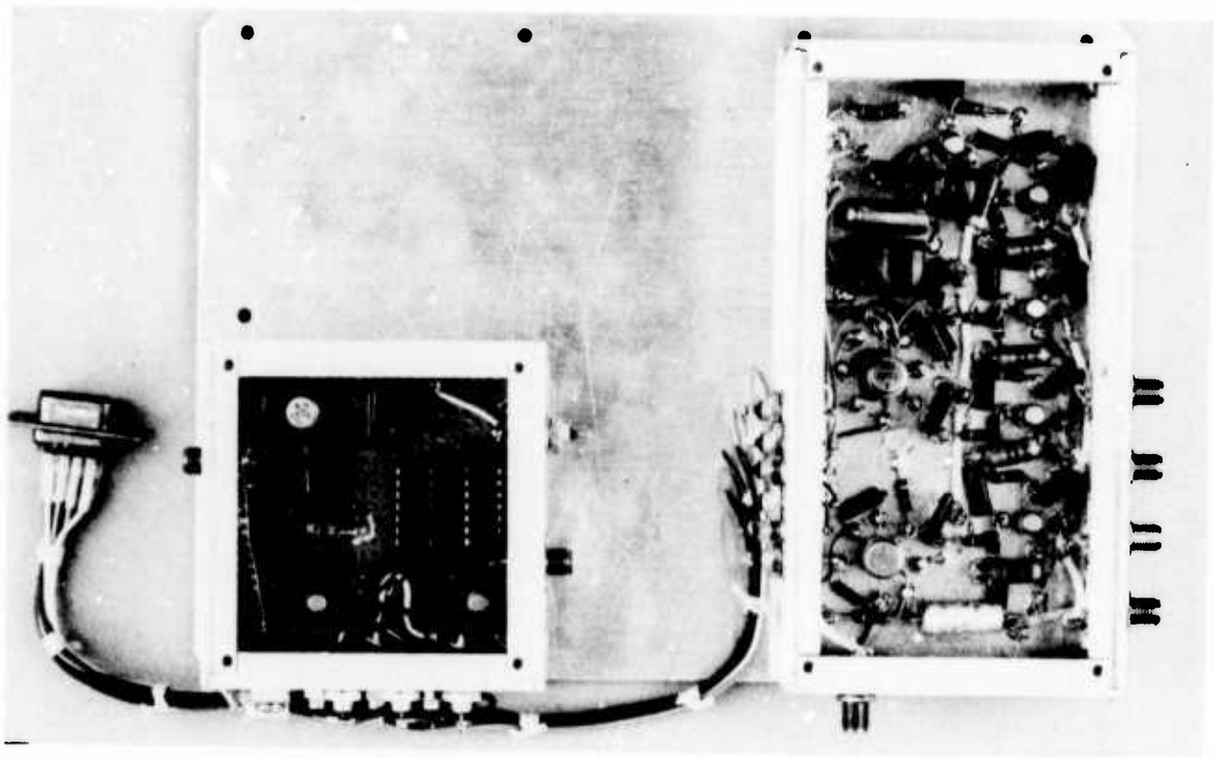
-001

NEXT ASSY: TYPE NO:

A

BOTTOM VIEW
PIN 1 BALANCE
2 INVERTING INPUT
3 NONINVERTING INPUT
4 -15V
5 BALANCE
6 OUTPUT
7 +15V
8 FREQ. COMPENSATION
UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE IN MFD/PF
RESISTANCE VALUES ARE IN OHMS
REVISIONS
LTR
DESCRIPTION
DATE
APPROVED
GAIN ADJ
OFFSET ADJ
+15V
-15V
+15 VDC
-15 VDC
TERMINAL NO
PENDENT CABLE
P/O A4P1
METER
EXT
Q DOPPLER
I DOPPLER
FREQUENCY STANDARD CONTROL
MIXER
U5 MIXER
U6 LM101A
U7 LM101A
U9 LM101A
U10 LM101A
VR1 IN752
VR2 IN752
MATERIAL
FINISH
UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES; TOL ON
HOLE DIAMETERS:
ANGLES: ±1.0°
CONTRACT NO
COLLINS RADIO COMPANY
SCHEMATIC DIAGRAM
A4 DOPPLER UNIT
PACKET RADIO TEST RCVR
SIZE D
CODE IDENT 13499
DWG NO 627 9408
SCALE
SHEET
-001

B



NOTES:
1. LM 10A (BOTTOM VIEW)

PIN 1. ADJUST
2. REFERENCE
3. REF SUPPLY
4. COMPENSATION
5. UNREGULATED INPUT (CONNECTED TO CASE)
6. CURRENT LIMIT
7. BOOSTER
8. REGULATED OUTPUT
9. GROUND
10. NO CONNECTION

2. UA 723 (BOTTOM VIEW)

PIN 1. CURRENT SENSE
2. INVERTING INPUT
3. NON INVERTING INPUT
4. V NEF
5. -V (CONNECTED TO CASE)
6. V OUT
7. V OUTPUT COLLECTOR
8. V+
9. FREQUENCY COMPENSATION
10. CURRENT LIMIT

3. PENDENT CABLE IS NO. 22 TEFLON WIRE OF COLOR CODE NOTED IN ()

TERMINAL NO.
OR COAX NO.

RVD
A5 P1

+20V 1 (1) 1 .001 μF

GND 4 (0) 2 .001 μF

-15V 5 (5) 3 .001 μF

8370Ω 1%

15Ω

LM 10A

2700Ω 1%

10 μF

μA 723

1 μH

8.2 K

1K

4.7 μF

10 MHz INPUT J5

2.2 μF

2N2222

95Ω

220Ω

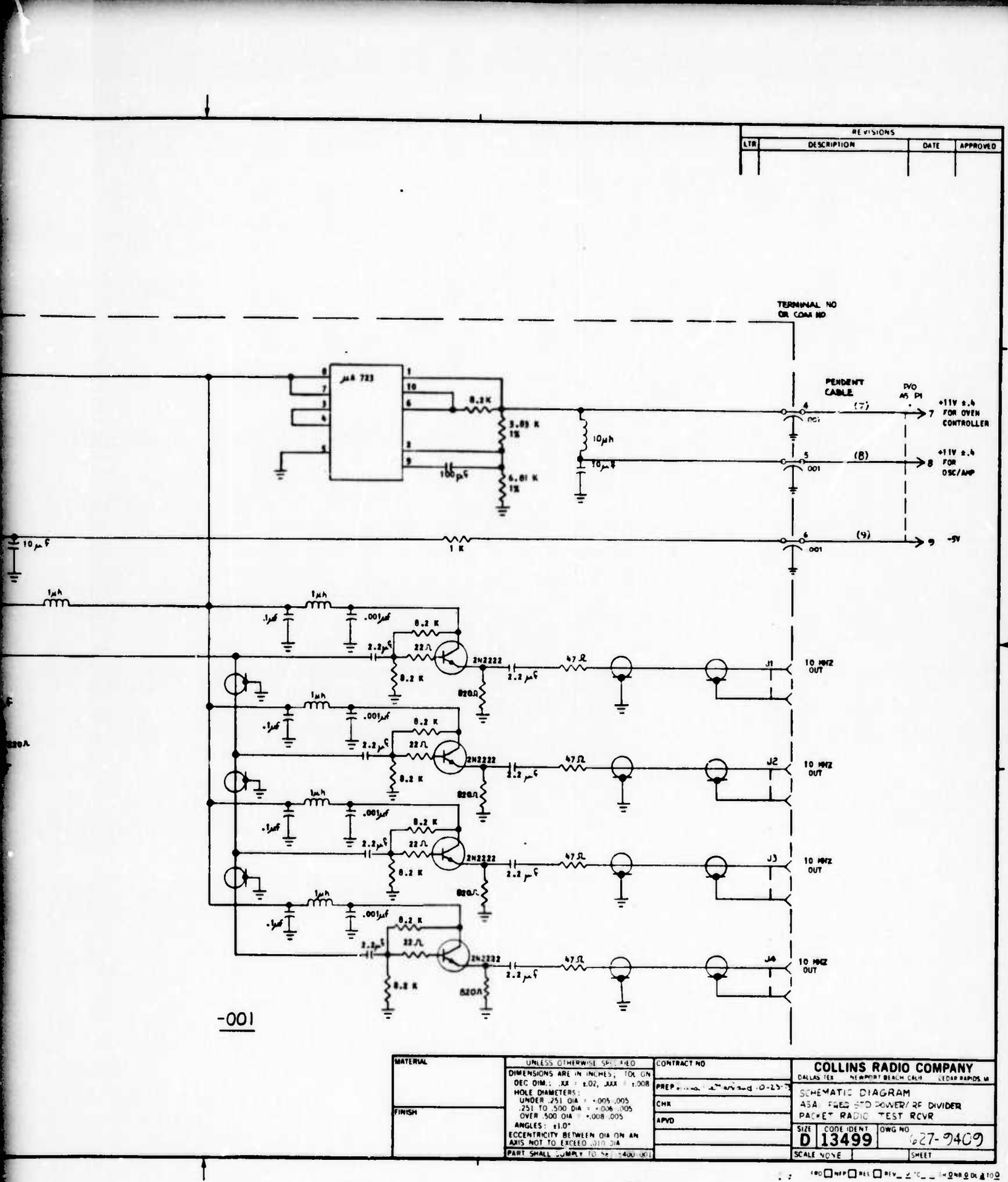
.1 μF

-001

NEXT ASSY

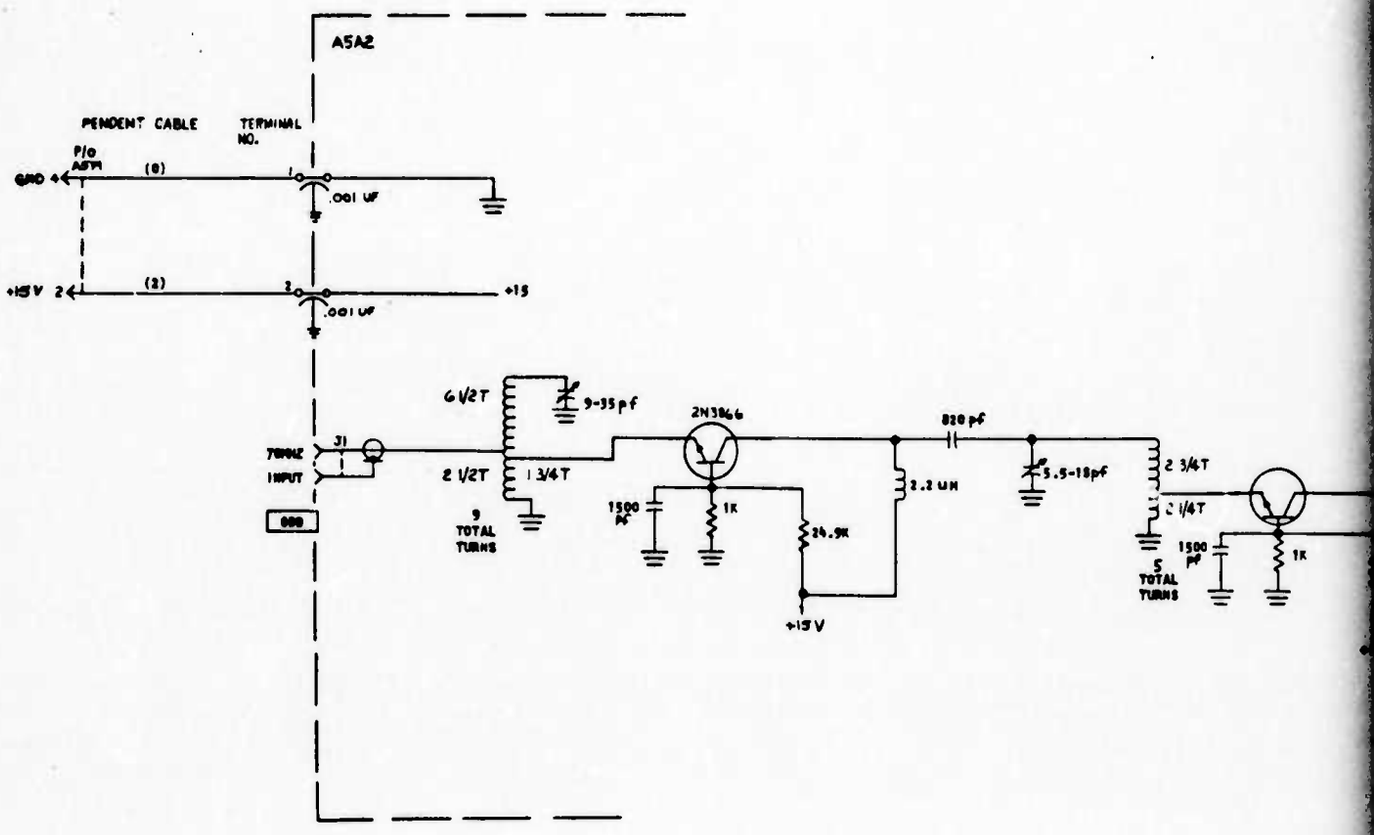
TYPE NO:

A


REVISIONS
LTR
DESCRIPTION
DATE
APPROVED
TERMINAL NO OR COAX NO
PENDENT CABLE
P/O A5 PI
μA 723
8.2 K
3.83 K 1%
6.81 K 1%
100 μF
10 μH
10 μF
1 K
+11V ±.4 FOR OVEN CONTROLLER
+11V ±.4 FOR OSC/AMP
-5V
1 μH
.1 μF
.001 μF
2.2 μF
22 Ω
2N2222
820 Ω
47 Ω
J1
J2
J3
J4
10 MHZ OUT
-001
MATERIAL
FINISH
UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES; TOL ON
DEC DIM.: .XX = ±.02, .XXX = ±.008
HOLE DIAMETERS:
UNDER .251 DIA = +.005 .005
.251 TO .500 DIA = +.006 .005
OVER .500 DIA = +.008 .005
ANGLES: ±1.0°
ECCENTRICITY BETWEEN DIA ON AN AXIS NOT TO EXCEED .010 DIA
CONTRACT NO
PREP
CHK
APVD
COLLINS RADIO COMPANY
DALLAS TEX NEWPORT BEACH CALIF CEDAR RAPIDS IA
SCHEMATIC DIAGRAM
ASA FREQ STD POWER/RF DIVIDER
PACKET RADIO TEST RCVR
SIZE D
CODE IDENT 13499
DWG NO 627-9409
SCALE NONE
SHEET

B

NOTES:
1. ALL COILS ON 1/4" DIAMETER NO 20 BUSS WIRE
2. PENDENT CABLE 12 NO 22 TEFLON WIRE OF COLOR CODE NOTED IN ()



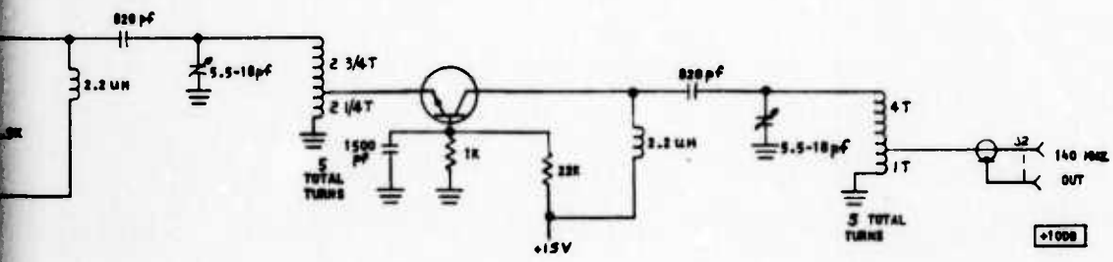
001

NEXT ASSY:

TYPE NO:

A

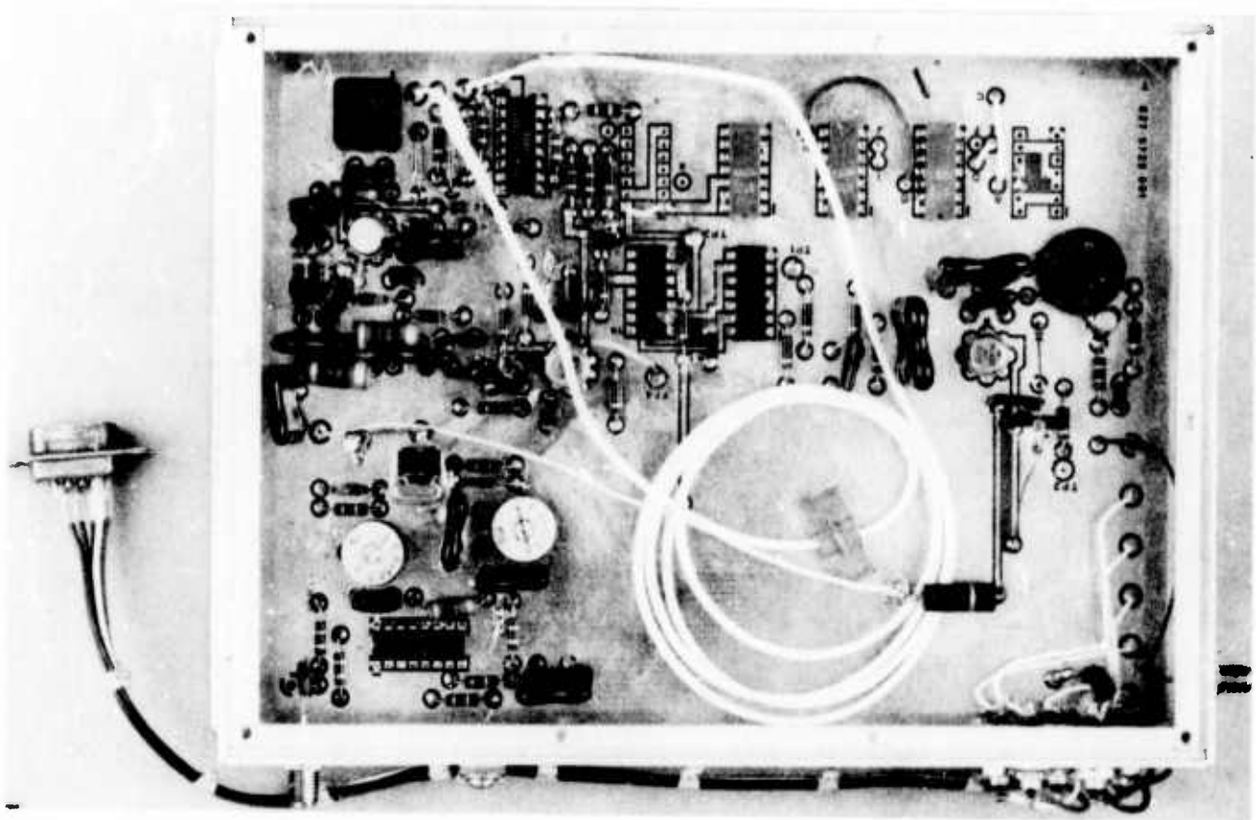
REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED



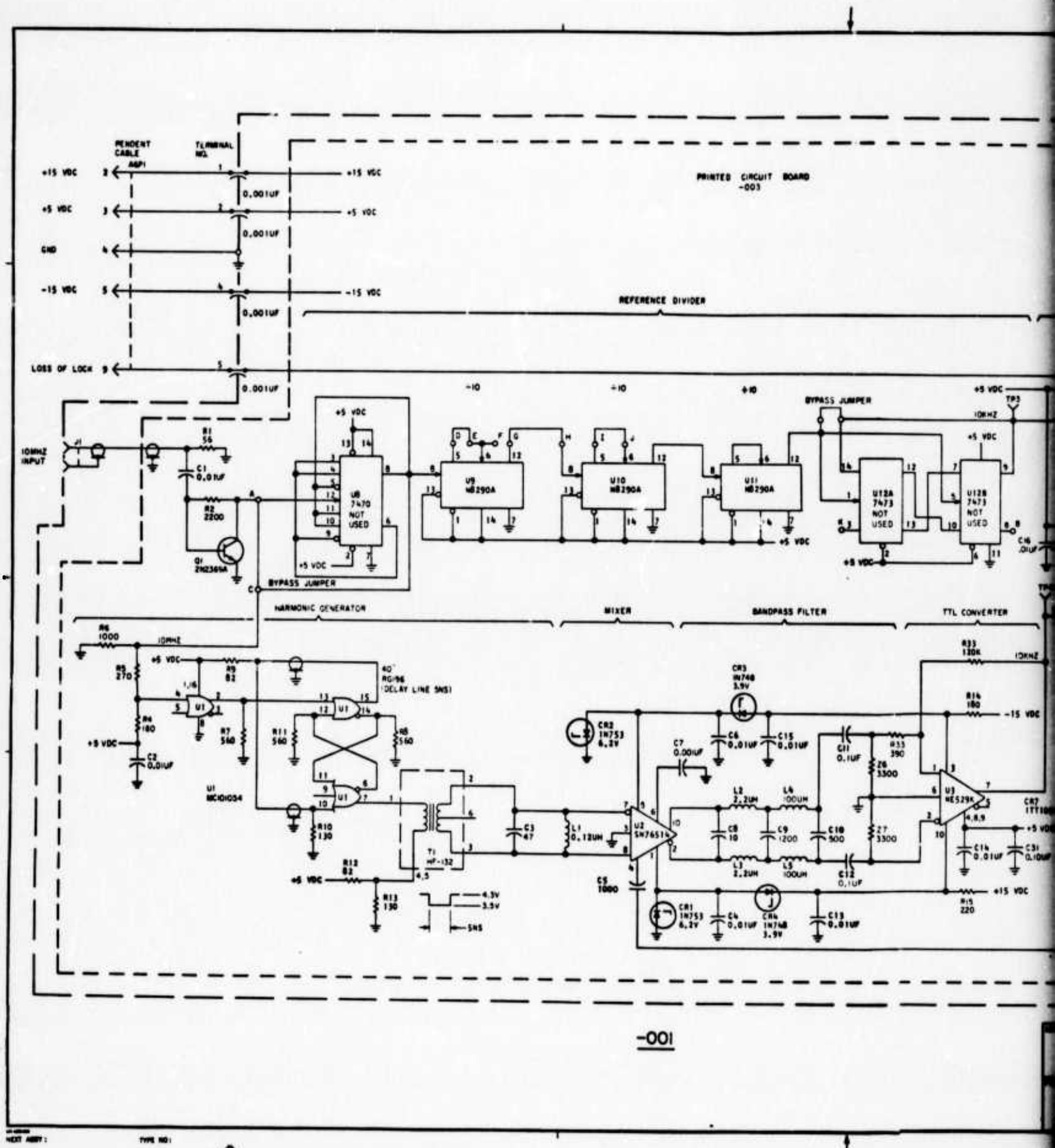
001

MATERIAL	UNLESS OTHERWISE SPECIFIED	CONTRACT NO	COLLINS RADIO COMPANY
FINISH	DIMENSIONS ARE IN INCHES, TOL ON DEC DIM.: .XX ± .02, .XXX ± .008 HOLE DIAMETERS: UNDER .251 DIA + .005 .005 .251 TO .500 DIA + .006 -.005 OVER .500 DIA + .008 .005 ANGLES: ±1.0° ECCENTRICITY BETWEEN DIA ON AN AXIS NOT TO EXCEED .010 DIA PART SHALL COMPLY TO SND 1400-001	PREP DIANA NETHERLAND 1 NOV 1973 CHR APVD	DALLAS TEX NEWPORT BEACH CALIF CEDAR RAPIDS, IA SCHEMATIC DIAGRAM A5 A2 MULTIPLIER X2 PACKET RADIO TEST RCVR
			SIZE D · CODE IDENT 13499 · DWG NO 627-9410
			SCALE NONE · SHEET

B



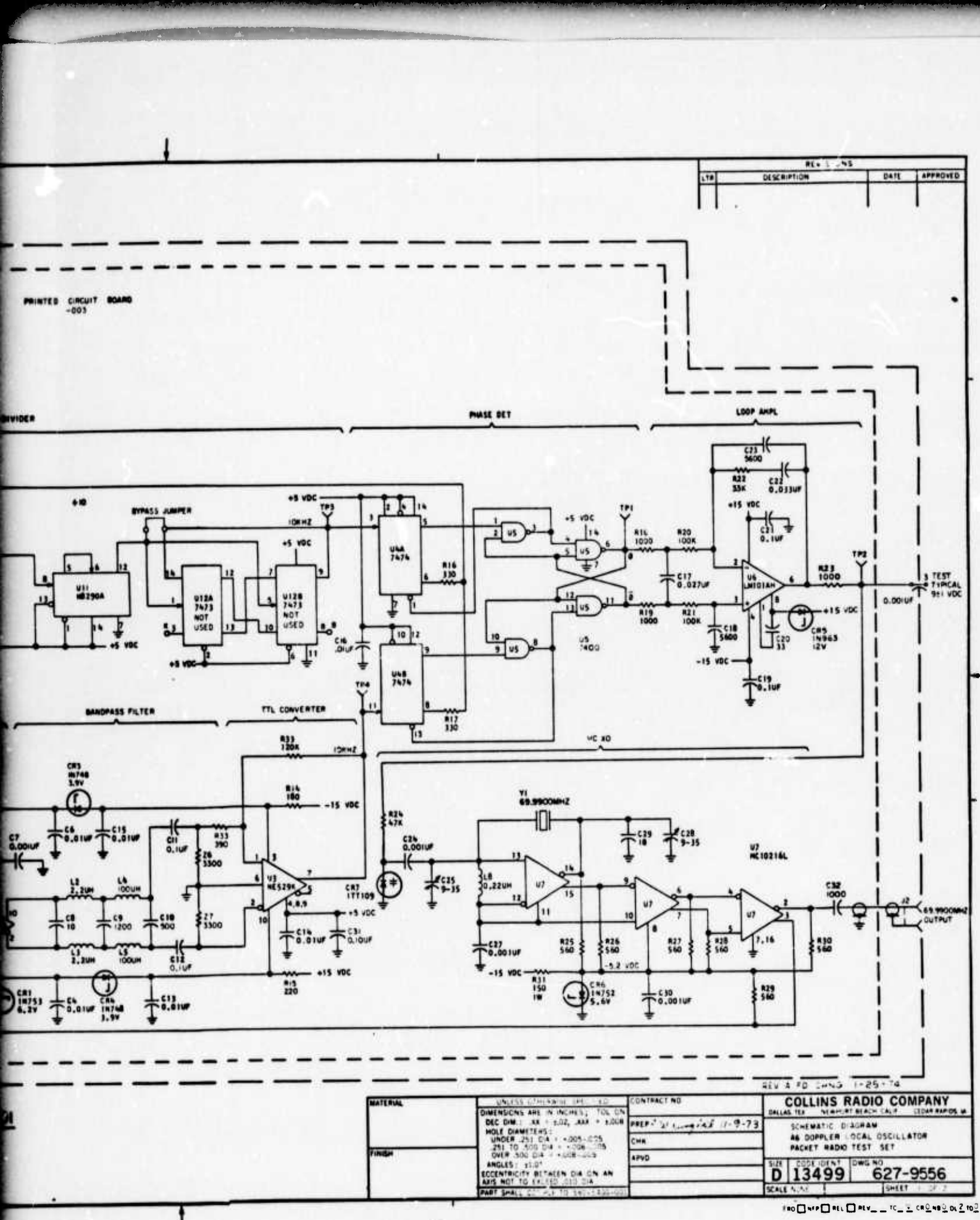
A6 - DOPPLER LO



-001

NEXT ASSY: TYPE NO:

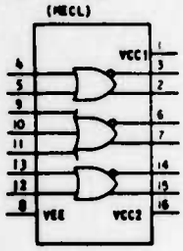
A


REVISIONS
LTR
DESCRIPTION
DATE
APPROVED
PRINTED CIRCUIT BOARD
-003
DIVIDER
PHASE DET
LOOP AMPL
BYPASS JUMPER
+5 VDC
10KHZ
TP3
TP1
TP2
TP4
U11 MB290A
U12A 7473 NOT USED
U12B 7473 NOT USED
U4A 7474
U4B 7474
U5 7400
U6 LM101AH
R16 330
R17 330
R14 1000
R20 100K
R19 1000
R21 100K
R23 1000
C23 3600
R22 33K
C22 0.033UF
C21 0.1UF
C17 0.027UF
C18 5600
C20 33
C19 0.1UF
+15 VDC
-15 VDC
CR5 1N963 12V
C16 .01UF
0.001UF
3 TEST TYPICAL 9±1 VDC
BANDPASS FILTER
TTL CONVERTER
VC XO
R33 120K
CR3 1N748 3.9V
R34 180
C7 0.001UF
C6 0.01UF
C15 0.01UF
C11 0.1UF
R35 390
Z6 5300
L3 2.2UH
L4 100UH
C8 10
C9 1200
C10 500
Z7 5300
L5 100UH
C12 0.1UF
U3 NE529K
4,8,9
C14 0.01UF
C31 0.1UF
R15 220
CR1 1N753 6.2V
C4 0.01UF
CR4 1N748 3.9V
C13 0.01UF
CR7 1TT109
R24 47K
C24 0.001UF
C25 9-35
Y1 69.9900MHZ
C29 18
C28 9-35
U7 MC10216L
L8 0.22UH
C27 0.001UF
R25 560
R26 560
R27 560
R28 560
R30 560
R29 560
-5.2 VDC
R31 150 1W
CR6 1N752 5.6V
C30 0.001UF
C32 1000
J2
69.990MHZ OUTPUT
MATERIAL
FINISH
CONTRACT NO
PREP
CHK
APVD
COLLINS RADIO COMPANY
DALLAS, TEX. NEWPORT BEACH, CALIF. CEDAR RAPIDS, IA.
SCHEMATIC DIAGRAM
A6 DOPPLER LOCAL OSCILLATOR
PACKET RADIO TEST SET
SIZE D
CODE IDENT 13499
DWG NO 627-9556
SCALE NONE
SHEET

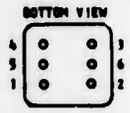
B

NOTES:

1. U1 MC10105L (MECL)



2. T1 2-MATCH RF 132



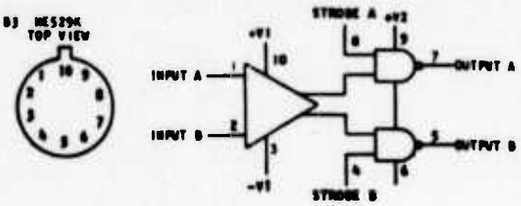
3. U8 SN76514

1 +VCC
2 OUTPUT
3 FLOATING GND
4 LOCAL OSC INPUT
5 -VCC
6 DECOUPLE 1
7 DECOUPLE 2
8 RF INPUT
9 B C
10 OUTPUT

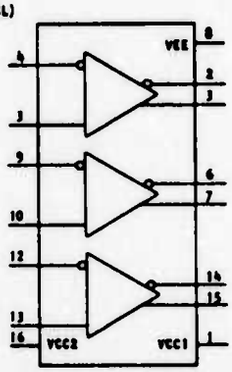
4. U9 THRU U11 MC290A

1 DATA STROBE
2 C OUT
3 DATA C
4 DATA A
5 A OUT
6 CLOCK 2
7 GND
8 CLOCK 1
9 B OUT
10 DATA B
11 DATA D
12 D OUT
13 DATA RESET
14 VCC

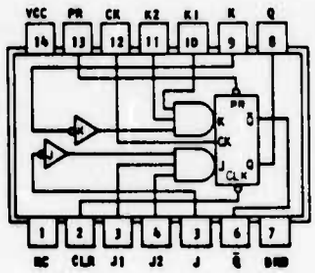
5. U3 MC529K



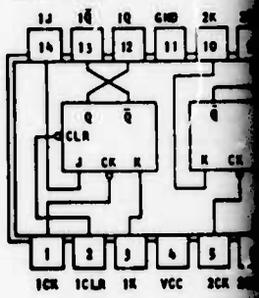
6. U7 MC10216L
TRIPPLE DIFF AMP (MECL)



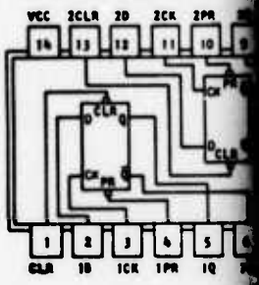
7. U8 T1 7470



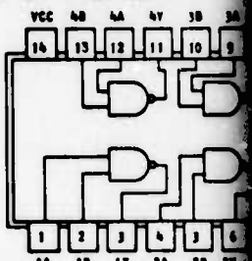
8. U12 T1 7473



9. U4 T1 7474 74074



10. U5 T1 7400 74S00

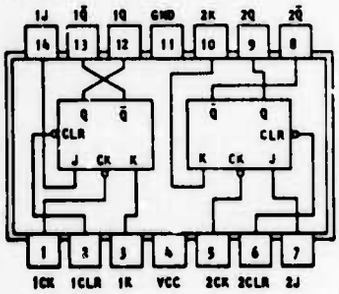


NEXT ASSY: TYPE NO:

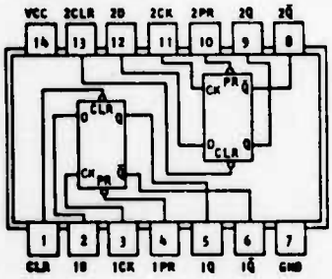
A

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED

8. U12 TI 7473

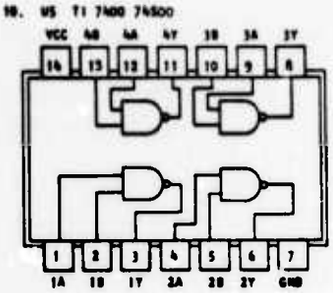


9. U4 TI 7474 74S74



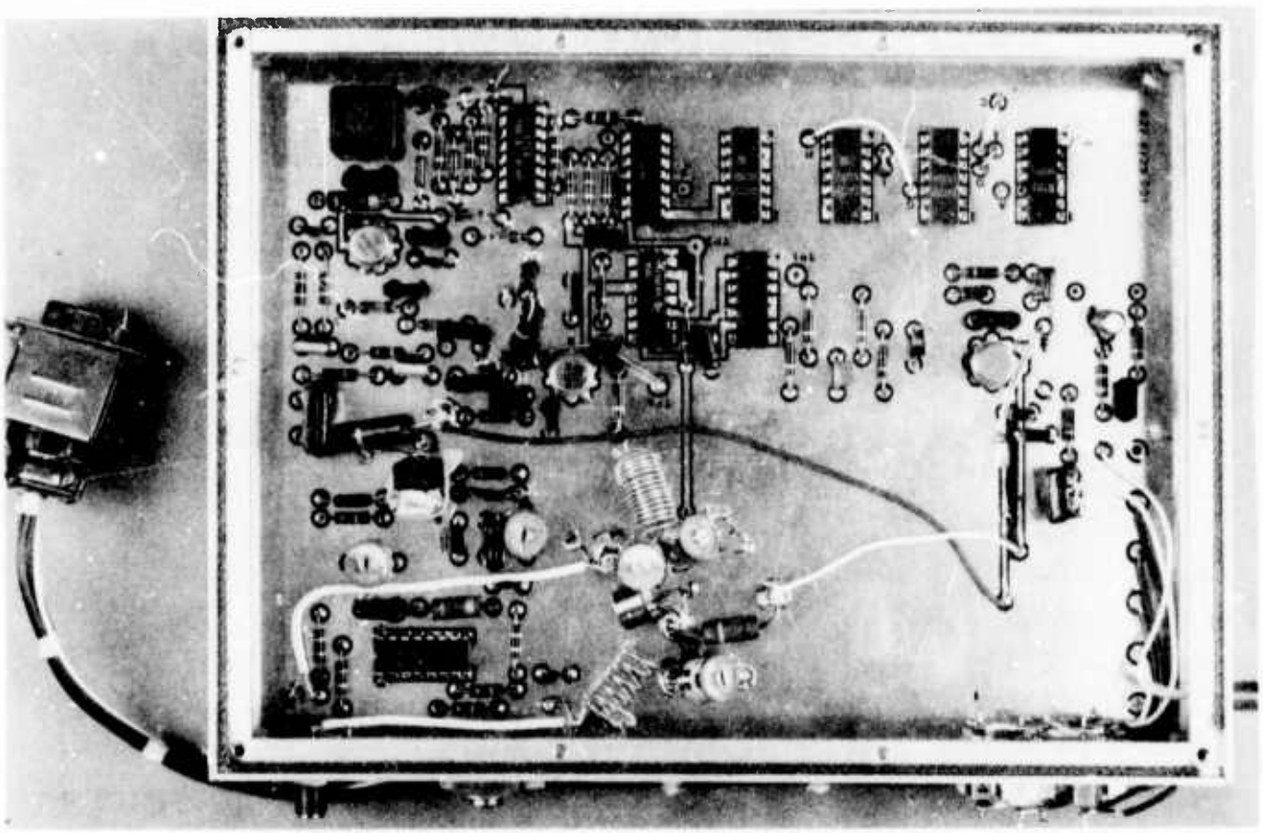
11. UNLESS OTHERWISE SPECIFIED
ALL RESISTANCE VALUES ARE IN OHMS
ALL RESISTORS ARE 1/4 W CARBON
ALL CAPACITANCE VALUES ARE IN PICOFARADS.

10. U5 TI 7400 74S00

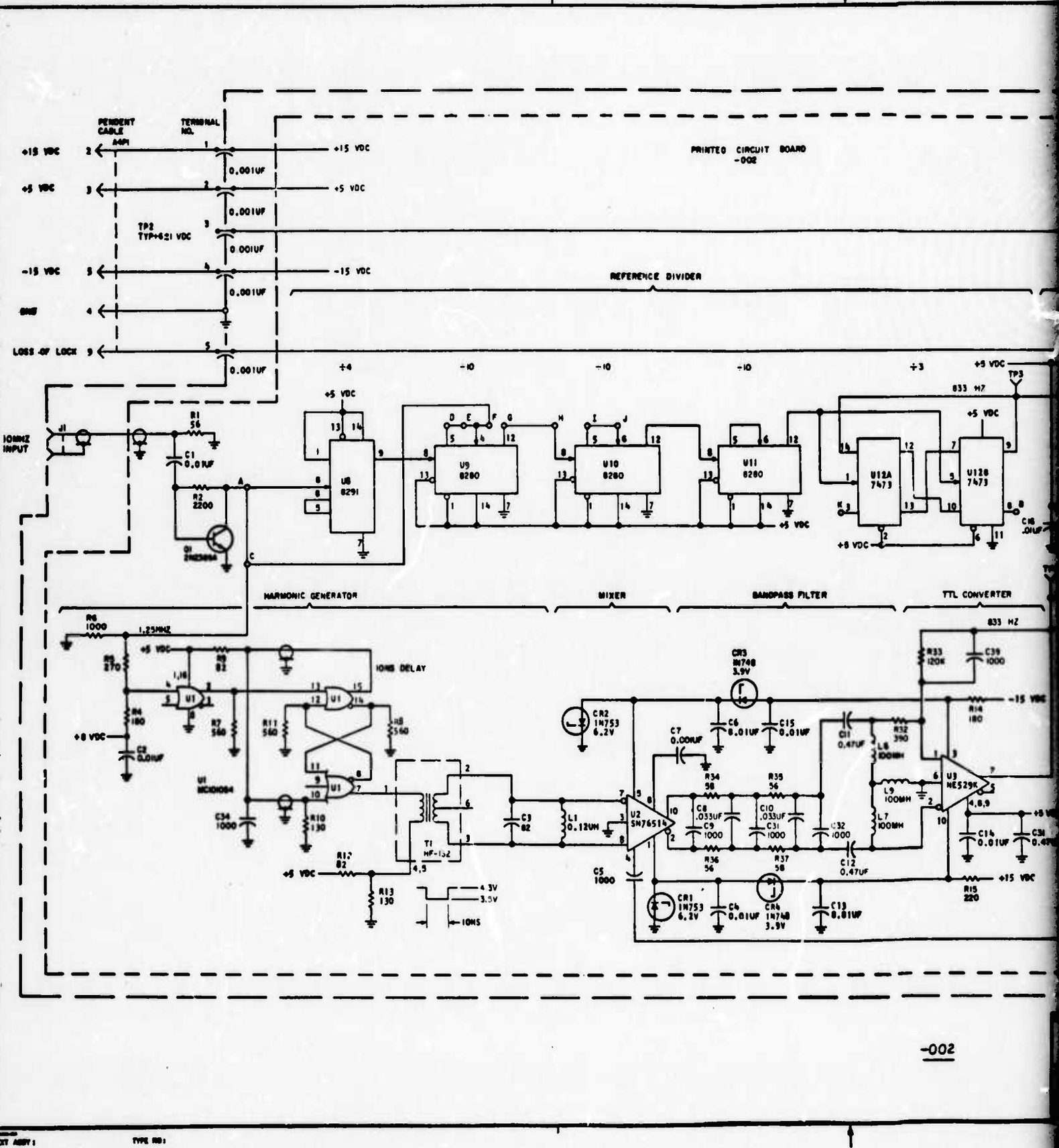


SIZE	CODE IDENT	DWG NO
D	13499	627-9556
SCALE NONE	REV	SHEET 2 OF 2

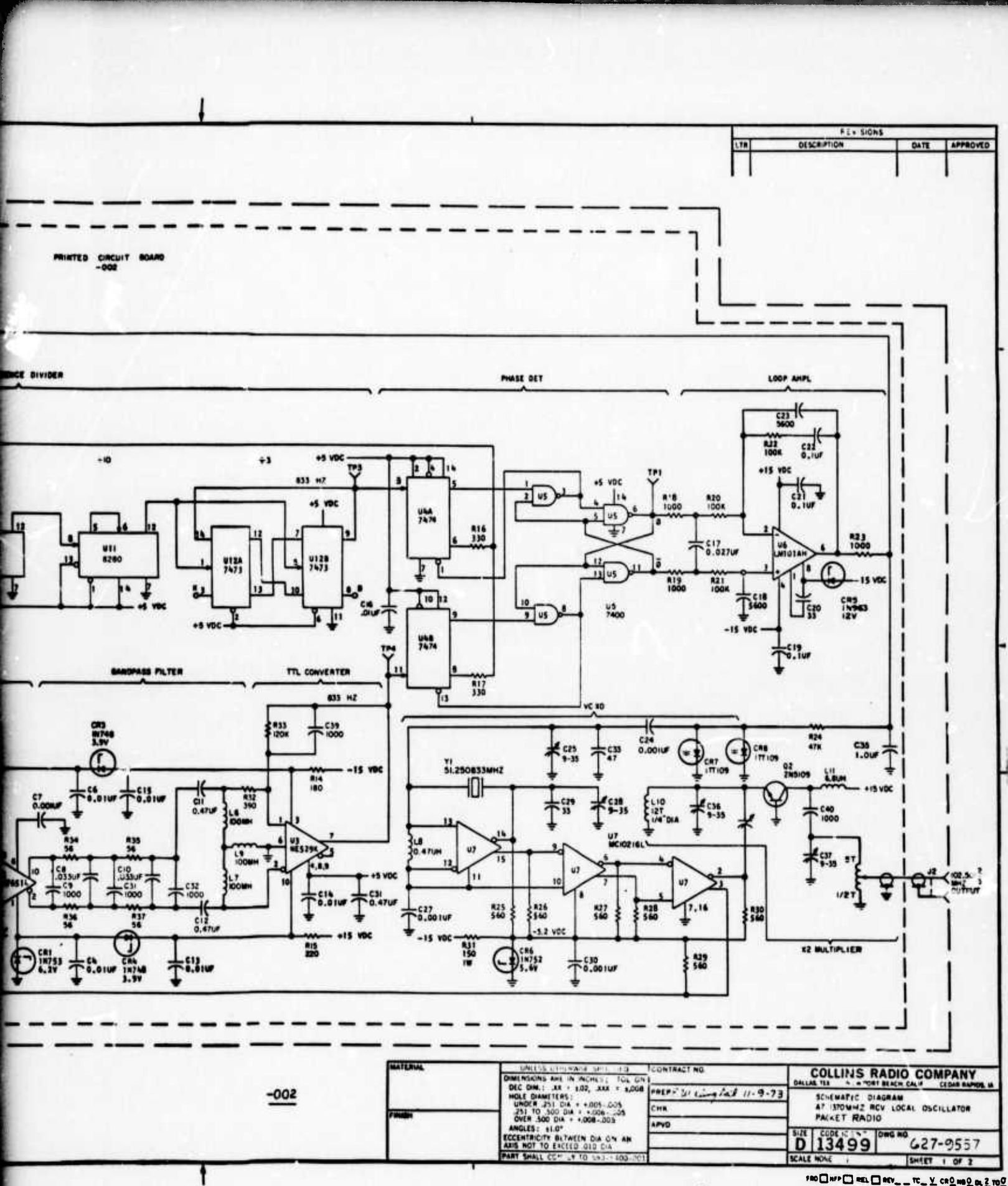
B



A7 - 1370 MHZ RCV LO


PENDENT CABLE A4P1
TERMINAL NO.
+15 VDC
+5 VDC
-15 VDC
GND
LOSS OF LOCK
0.001UF
PRINTED CIRCUIT BOARD -002
TP2 TYP+6.21 VDC
REFERENCE DIVIDER
÷4
÷10
÷10
÷10
÷3
833 HZ
IONHZ INPUT
J1
R1 56
C1 0.01UF
R2 2200
Q1 2N3904
U8 8291
U9 8280
U10 8280
U11 8280
U12A 7473
U12B 7473
C16 .01UF
HARMONIC GENERATOR
MIXER
BANDPASS FILTER
TTL CONVERTER
R6 1000
1.25MHZ
R5 270
R9 82
IONS DELAY
U1 MC10H084
R4 180
C2 0.01UF
R7 560
R11 560
R8 560
C34 1000
R10 130
T1 HF-152
R12 82
R13 130
4.3V
3.5V
10MS
CR3 IN748 3.9V
CR2 IN753 6.2V
C7 0.001UF
C6 0.01UF
C15 0.01UF
C5 1000
U2 SN76514
L1 0.12UH
C3 82
R34 56
R35 56
C8 .033UF
C9 1000
C10 .033UF
C31 1000
C32 1000
R36 56
R37 56
C12 0.47UF
C11 0.47UF
R32 390
L8 100MH
L9 100MH
L7 100MH
U3 NE529K
R33 120K
C39 1000
R14 180
C14 0.01UF
C38 0.47UF
R15 220
CR1 IN753 6.2V
C4 0.01UF
CR4 IN748 3.9V
C13 0.01UF
-002

A

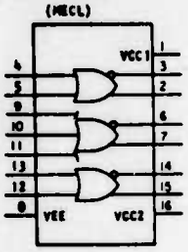


MATERIAL		CONTRACT NO.	COLLINS RADIO COMPANY
FINISH	-002	PREP'D [illegible] 11-9-73	SCHEMATIC DIAGRAM
		CHK	AT 1370MHZ RCV LOCAL OSCILLATOR
		APVD	PACKET RADIO
			SIZE D · CODE 13499 · DWG NO 627-9557
			SCALE NONE · SHEET 1 OF 2

B

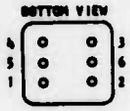
NOTES:

1. U1 MC10105L (MECL)



2. T1 2-MATCH RF 132

BOTTOM VIEW



3. U2 SN76514

TOP VIEW

1 +VCC
2 OUTPUT
3 FLOATING GND
4 LOCAL OSC INPUT
5. -VCC
6 DECOUPLE 1
7. DECOUPLE 2
8 RF INPUT
9 A C
10 OUTPUT

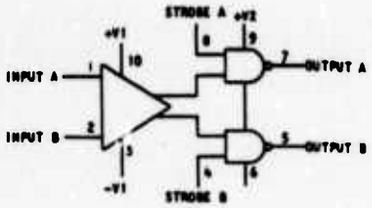
4. U9 THRU U11 MB200

TOP VIEW

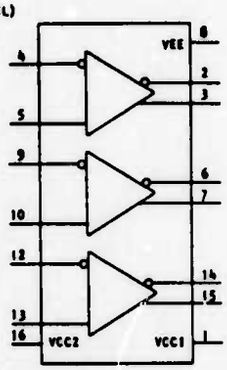
1 DATA STROBE
2 C OUT
3 DATA C
4 DATA A
5 A OUT
6 CLOCK 2
7 GND
8 CLOCK 1
9 B OUT
10 DATA B
11 DATA D
12 D OUT
13 DATA RESET
14 VCC

5. U3 ME529K

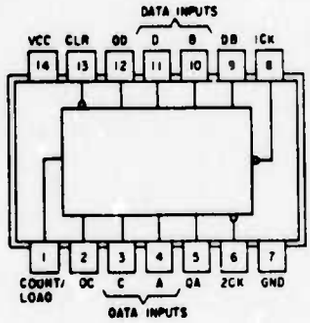
TOP VIEW



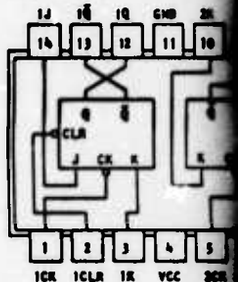
6. U7 MC10216L
TRIPPLE DIFF AMP (MECL)



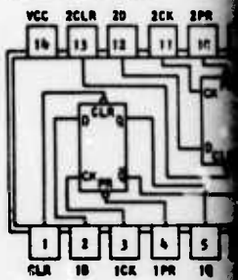
7. U8 N8291



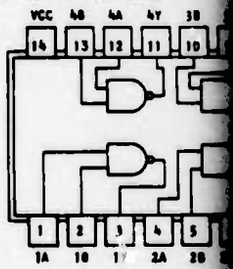
8. U12 TI 7473



9. U4 TI 7474 74S74



10. U5 TI 7400 74S00



-002

NEXT ASSY: TYPE MB:

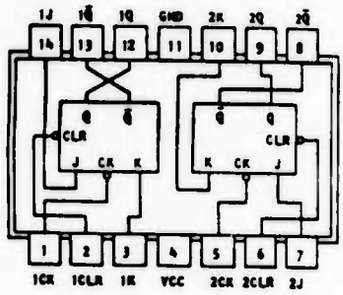
A

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED

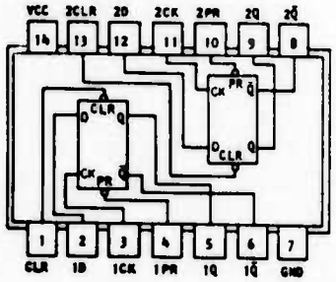
OUTPUT A

OUTPUT B

8. U12 TI 7473

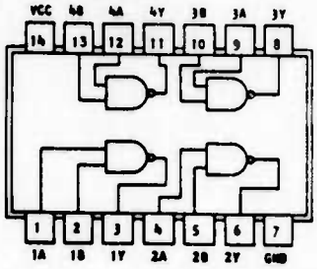


9. U4 TI 7474 74S74



11. UNLESS OTHERWISE SPECIFIED
ALL RESISTANCE VALUES ARE IN OHMS
ALL RESISTORS ARE 1/4 W CARBON
ALL CAPACITANCE VALUES ARE IN PICOFARADS.

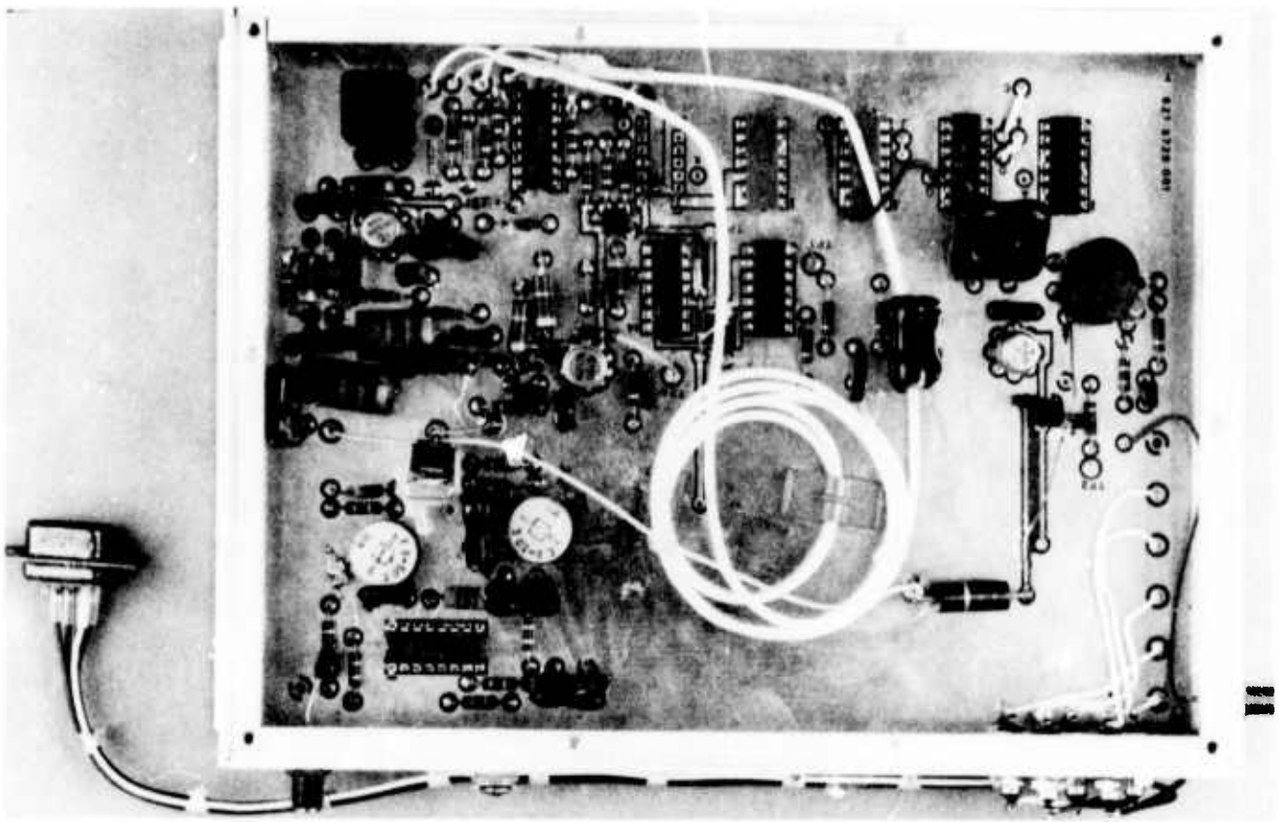
10. U5 TI 7400 74S00



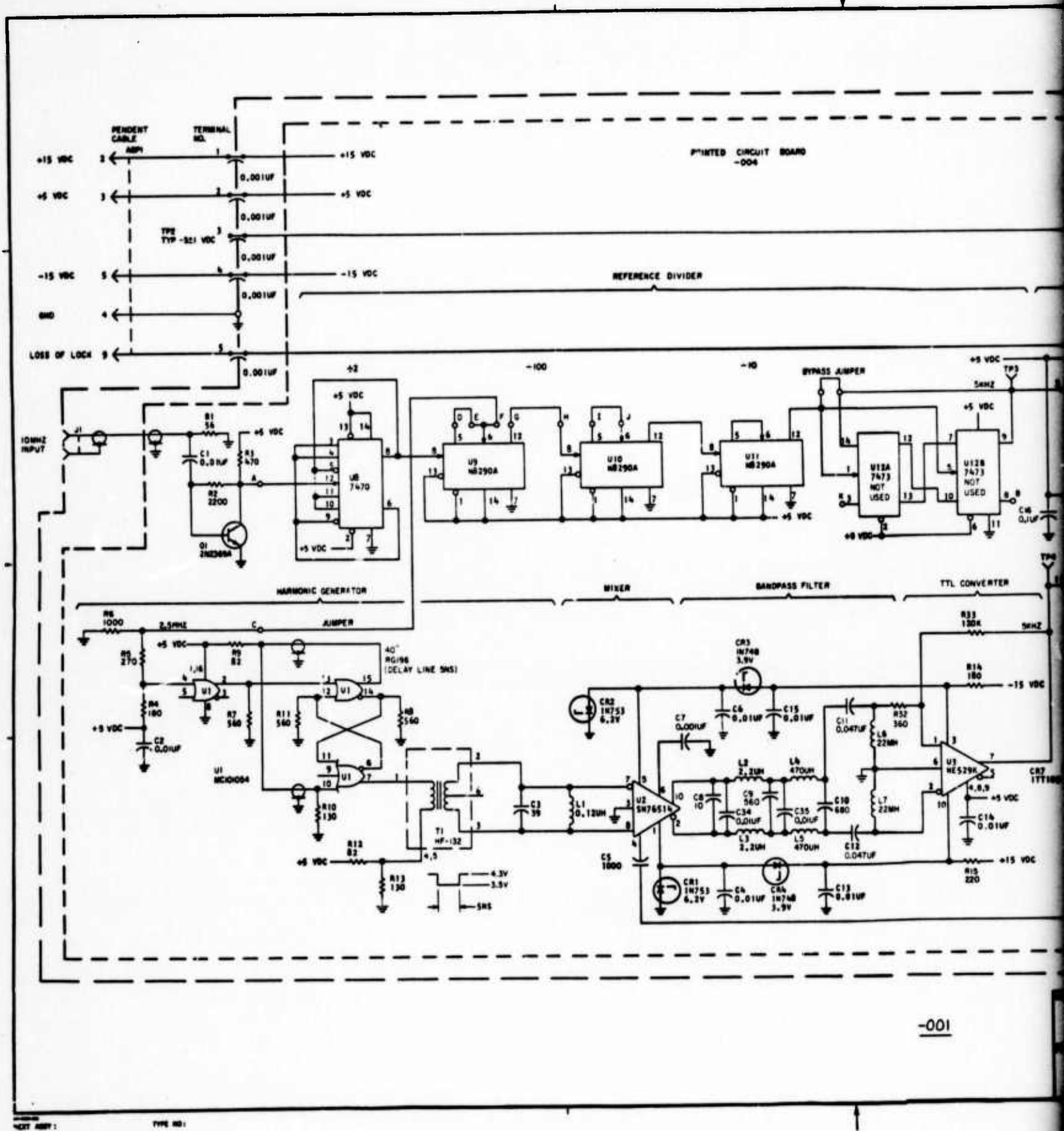
-002

SIZE	CODE IDENT	DWG NO
D	13499	627-9557
SCALE NONE	REV	SHEET 2 OF 2

5



A8 - 430 MHZ RCV LO

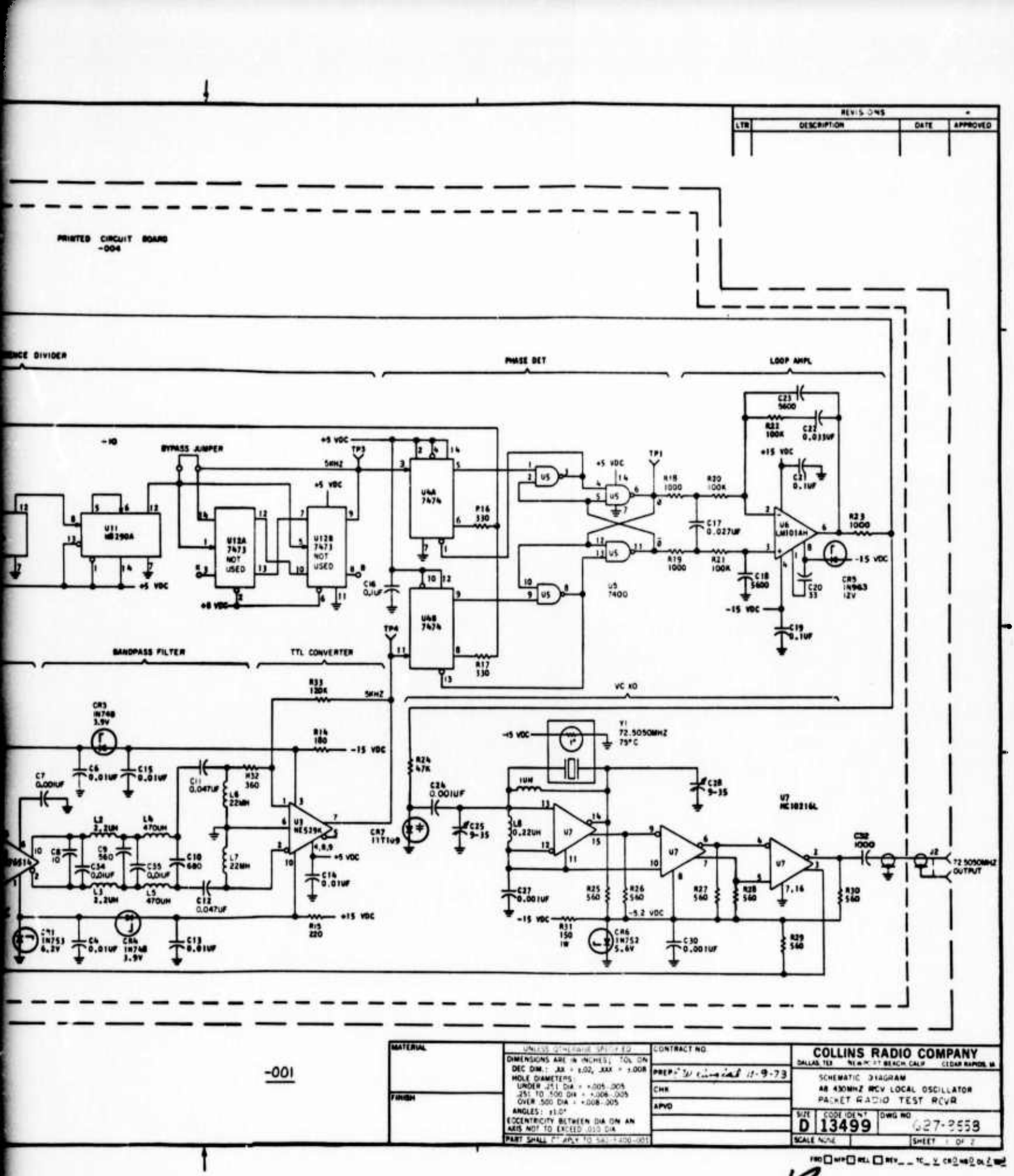


-001

NEXT ASSY:

TYPE NO:

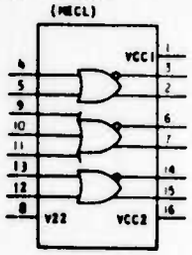
A


REVISIONS
LTR
DESCRIPTION
DATE
APPROVED
PRINTED CIRCUIT BOARD
-004
PHASE DET
LOOP AMPL
BYPASS JUMPER
+5 VDC
5MHZ
U11
MB290A
U12A
7473
NOT
USED
U12B
7473
NOT
USED
U4A
7474
U4B
7474
U5
7400
U6
LM101AH
-15 VDC
+8 VDC
BANDPASS FILTER
TTL CONVERTER
VC XO
U3
NE529K
U7
MC10216L
Y1
72.5050MHZ
75°C
72.5050MHZ
OUTPUT
-001
MATERIAL
FINISH
CONTRACT NO.
COLLINS RADIO COMPANY
DALLAS, TEX
CEDAR RAPIDS, IA
SCHEMATIC DIAGRAM
AR 430MHZ RCV LOCAL OSCILLATOR
PACKET RADIO TEST RCVR
SIZE
D
CODE IDENT
13499
DWG NO
627-2558
SCALE NONE
SHEET 1 OF 2

B

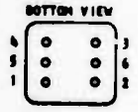
NOTES:

1. U1 MC10105L
(MECL)



2. T1 2-MATCH RF 132

BOTTOM VIEW



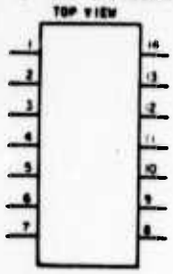
3. U2 SR76514

TOP VIEW

1	+VCC
2	OUTPUT
3	FLOATING GND
4	LOCAL OSC INPUT
5	-VCC
6	OSCOUPLE 1
7	OSCOUPLE 2
8	RF INPUT
9	R C
10	OUTPUT

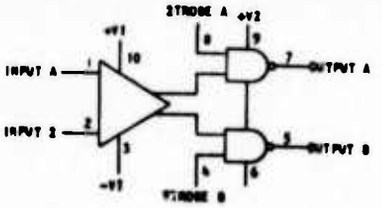
4. U9 THRU U11 MB290A

TOP VIEW

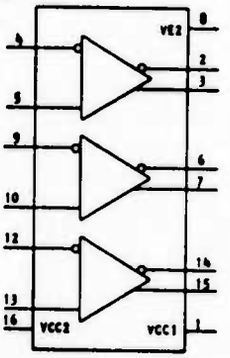


1	DATA STROBE
2	C OUT
3	DATA C
4	DATA A
5	A OUT
6	CLOCK 2
7	GND
8	CLOCK 1
9	B OUT
10	DATA B
11	DATA B
12	B OUT
13	DATA RESET
14	VCC

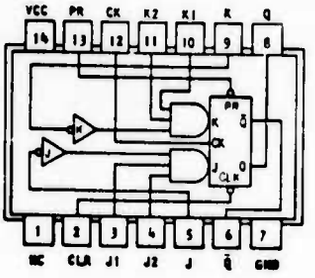
5. U3 MB539K
TOP VIEW



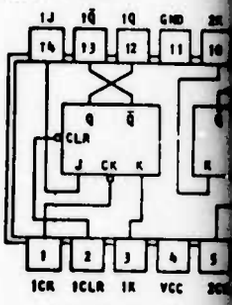
6. U7 MC10216L
TRIPPLE DIFF AMP (MECL)



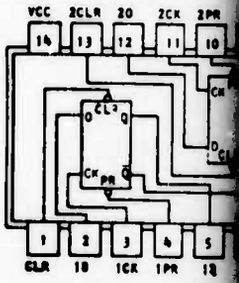
7. U8 TI 7470



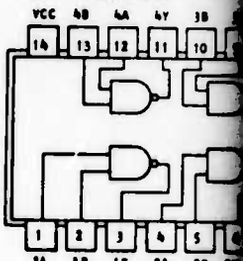
8. U12 TI 7473



9. U4 TI 7474 /4874



10. U5 TI 7400 74S00

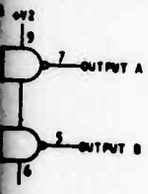


NEXT ASSY:

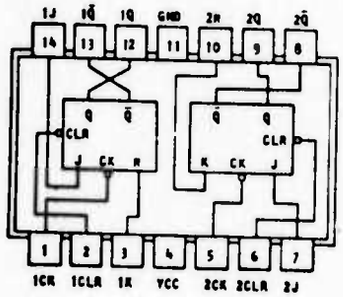
TYPE MD:

A

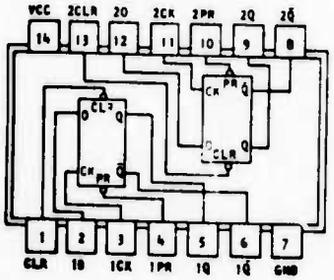
REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED



8. U12 TI 7473

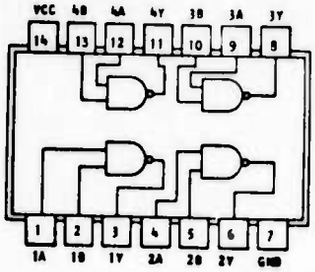


9. U4 TI 7474 74S74



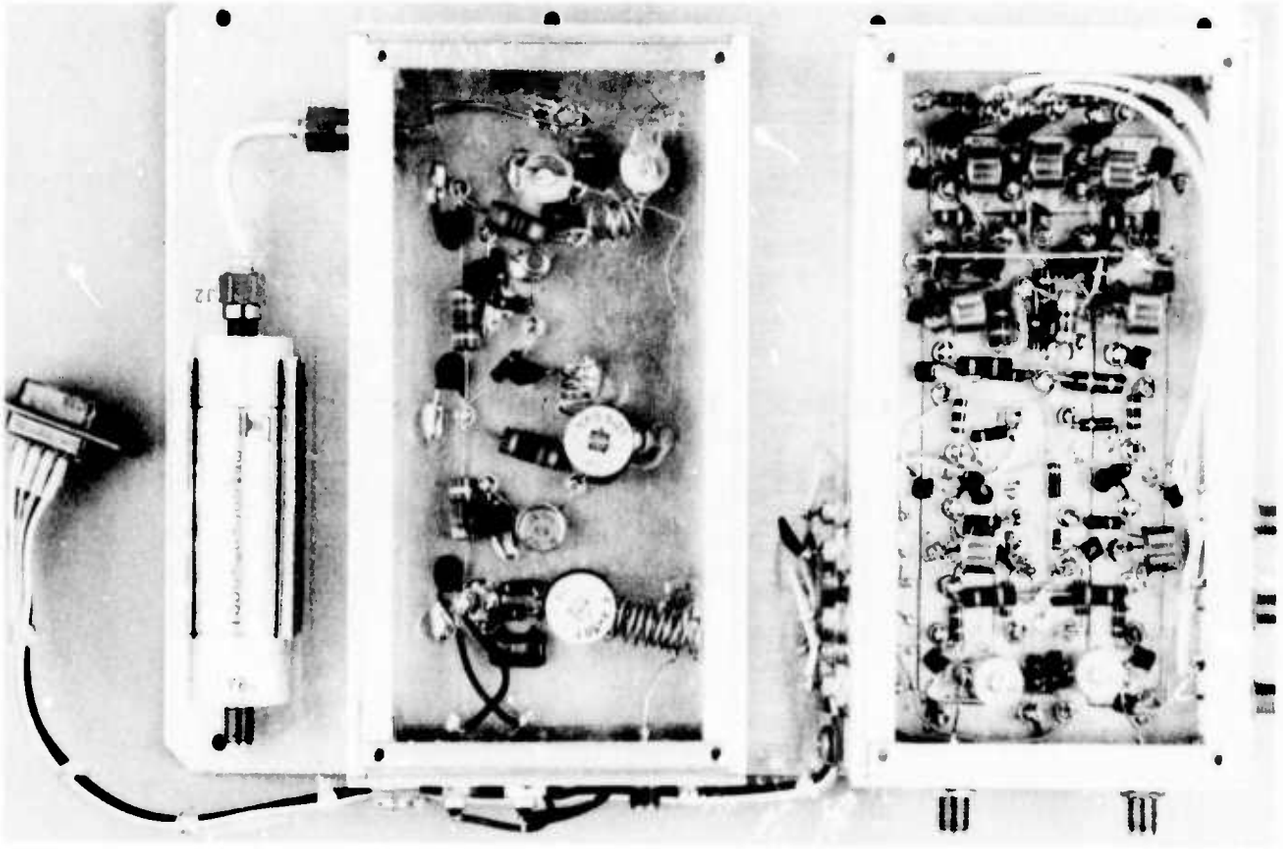
11. UNLESS OTHERWISE SPECIFIED
ALL RESISTANCE VALUES ARE IN OHMS
ALL RESISTORS ARE 1/4 W CARBON
ALL CAPACITANCE VALUES ARE IN PICOFARADS.

10. U5 TI 74S00 74S00



SIZE	CODE IDENT	DWG NO
D	13499	627-3548
SCALE NONE	REV	SHEET 2 OF 2

B

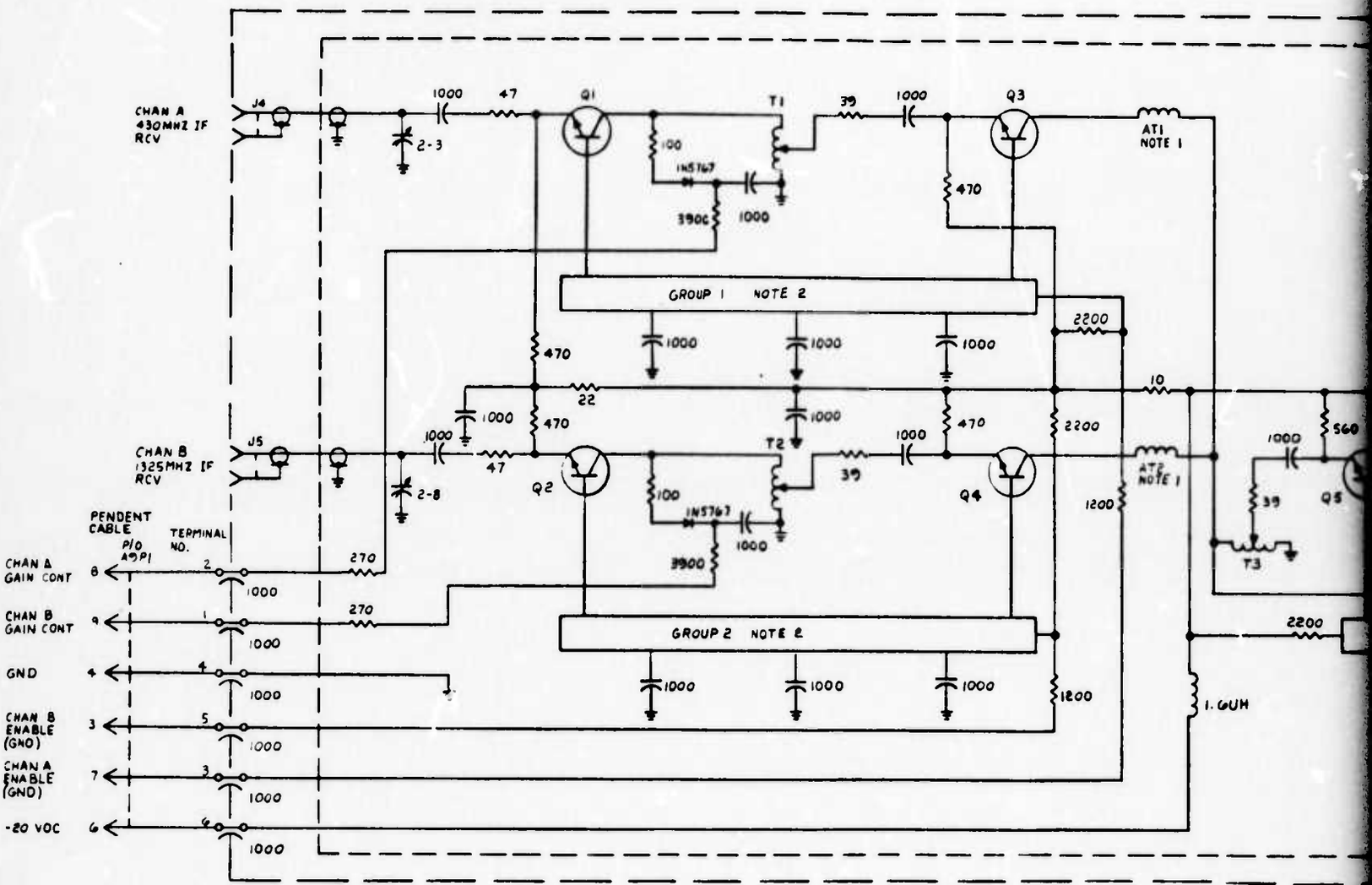


A9A1 - Signal Splitter/Combiner

NOTES:

1. AT-1 AND AT-2 ARE PARASITIC SUPPRESSOR FERRITE BEADS ON COLLECTOR LEADS OF Q-3 AND Q-4.
2. GP-1, GP-2 AND GP-3 ARE AF GROUND PLANES WHICH ARE CAPALITY COUPLED TO DC AND AF GROUND BUT ARE BIASED FROM DC GROUND. RF SWITCHING BETWEEN CH 1 AND CH 2 IS ACCOMPLESHED BY BIASING CHANGE ON THESE GROUND PLANES.
3. ALL TRANSISTORS (Q-1 THRU Q-7) ARE TYPE 2N5109.
4. WINDING DETAIL FOR TRANSFORMERS T-1 THRU T-8

5. PENDENT CABLE AO 22 TEFLON WIRE, (NO) REPRESENTS COLOR CODE.
6. UNLESS OTHER SPECIFIED
   ALL RESISTANCE VALUES ARE IN OHMS
   ALL CAPACITANCE VALUES ARE IN PICOFARADS.



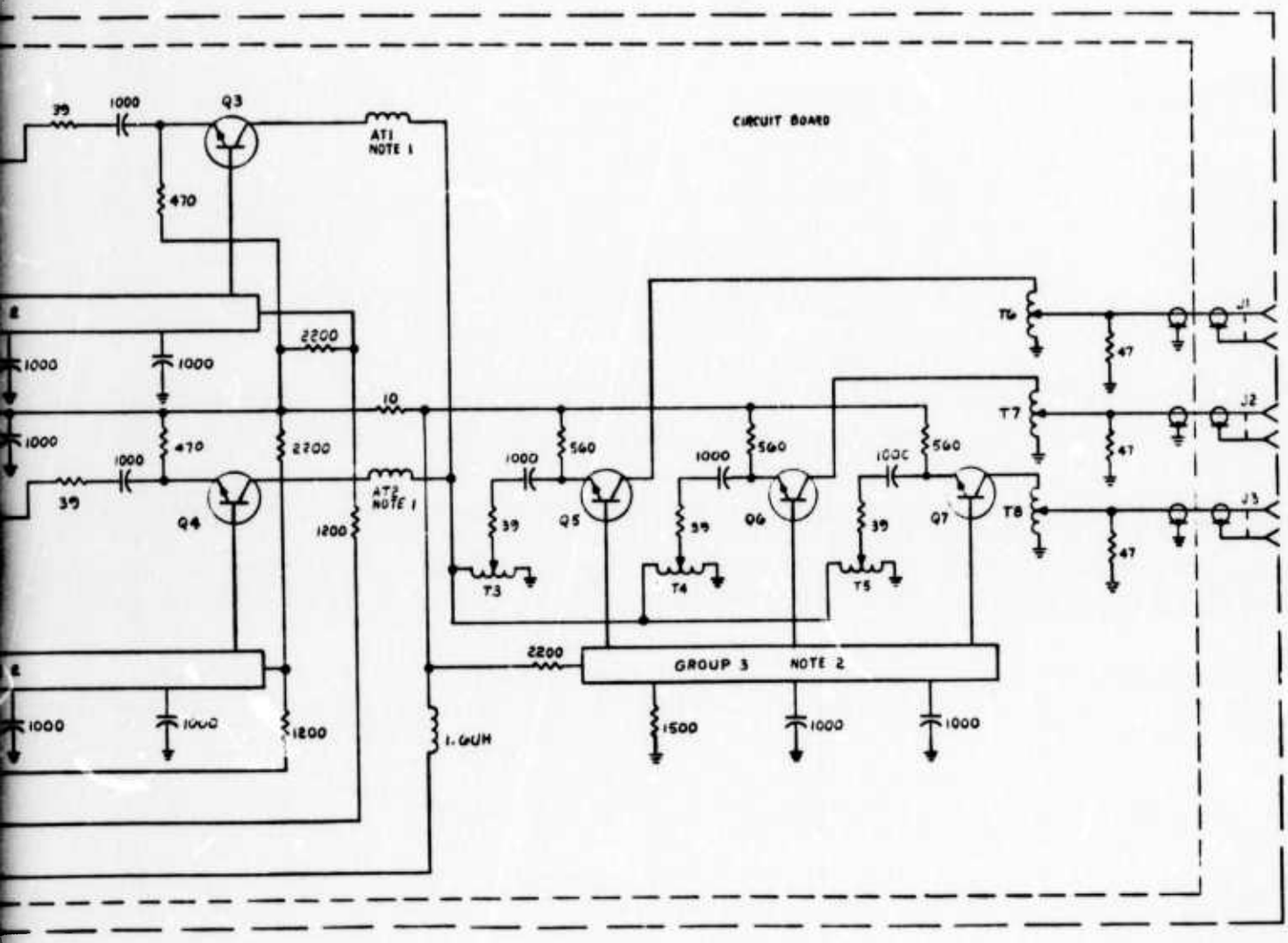
-001

NEXT ASSY:

TYPE NO:

A

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED



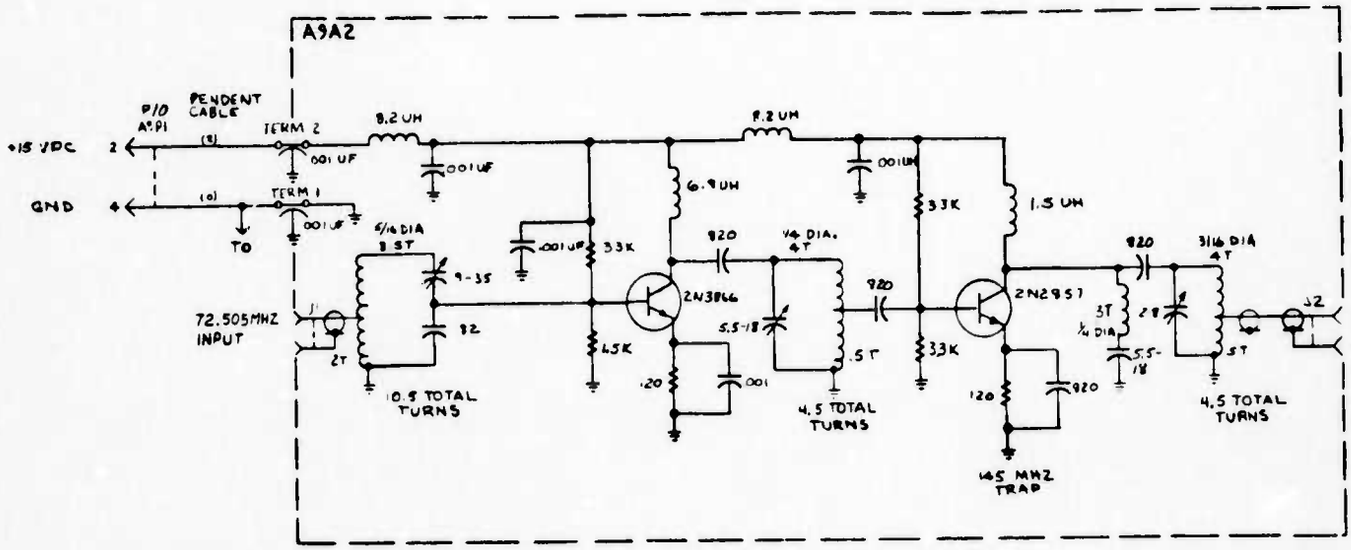
-001

MATERIAL	UNLESS OTHERWISE SPECIFIED	CONTRACT NO	COLLINS RADIO COMPANY
	DIMENSIONS ARE IN INCHES; TOL ON DEC DIM.: .XX = ±.02, .XXX = ±.008 HOLE DIAMETERS: UNDER .251 DIA = +.005 -.005 .251 TO .500 DIA = +.006 -.005 OVER .500 DIA = +.008 -.005 ANGLES: ±1.0° ECCENTRICITY BETWEEN DIA ON AN AXIS NOT TO EXCEED .010 DIA PART SHALL COMPLY TO SPEC 54 [illegible] 001	PREP [illegible] 11-8-75 CHK APVD	DALLAS TEX NEWPORT BEACH CALIF CEDAR RAPIDS IA
FINISH			SCHEMATIC DIAGRAM 49AI SIGNAL SPLITTER AND GAIN CONT PACKET RADIO TEST RCVR
			SIZE D · CODE IDENT 13499 · DWG NO 627-9659
			SCALE [illegible] · SHEET [illegible]

IRO ☐ NIP ☐ REL ☐ REV _ X [illegible]

B

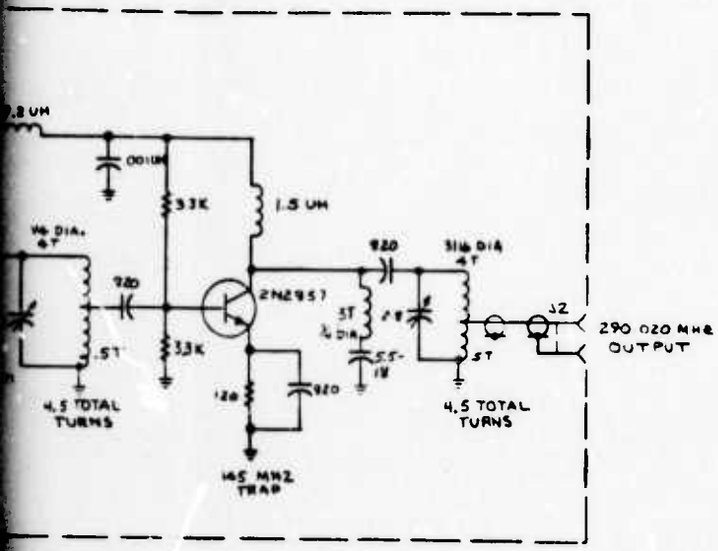
NOTES:
1. COILS WOUND WITH #20 BUSS WIRE
2. PENDENT CABLE NO 22 TEFLON WIRE, (#0) REPESENTS COLOR CODE
3. UNLESS OTHERWISE NOTED ALL CAPACITORS IN PICOFARADS



NEXT ASSY: TYPE NO:

A

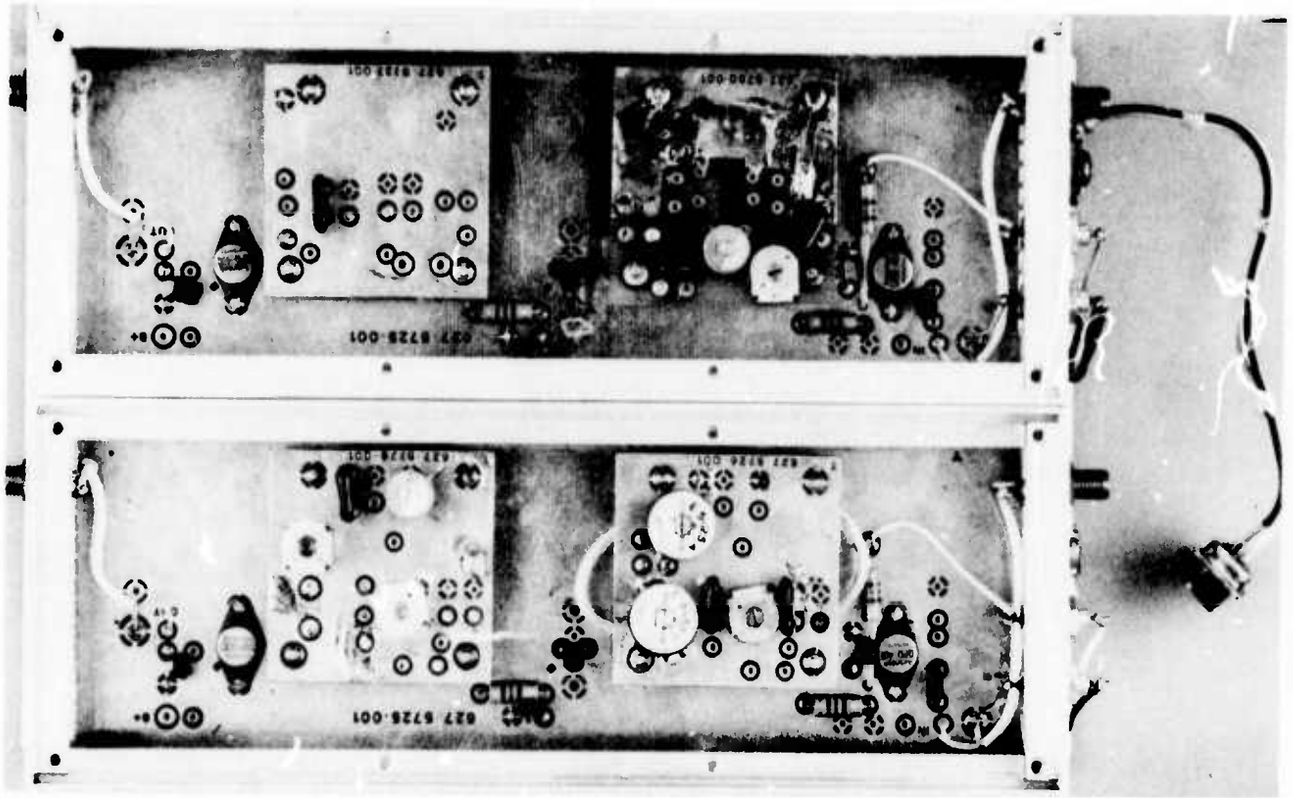
REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED



MATERIAL	UNLESS OTHERWISE SPECIFIED	CONTRACT NO	COLLINS RADIO COMPANY
FINISH	DIMENSIONS ARE IN INCHES; TOL ON DEC DIM.: .XX ± .02, .XXX ± .008 HOLE DIAMETERS: UNDER .251 DIA + .005 -.005, .251 TO .500 DIA + .006 -.005, OVER .500 DIA + .008 -.005 ANGLES: ±1.0° ECCENTRICITY BETWEEN DIA ON AN AXIS NOT TO EXCEED .010 DIA PART SHALL COMPLY TO MIL-STD-100	PREP [illegible] DATE 3-11-73 CHK APVD	DALLAS TEX NEWPORT BEACH CALIF CEDAR RAPIDS IA WIRING DIAGRAM A2A2 MULTIPLIER X4 PACKET RADIO TEST POUR SIZE D · CODE IDENT 13499 · DWG NO 627-9659 SCALE NONE · SHEET 1 OF 1

FRO ☐ NFP ☐ RE- ☐ REV__ TO__ ☐ CR ☐ ND ☐ OL ☐ TO

B



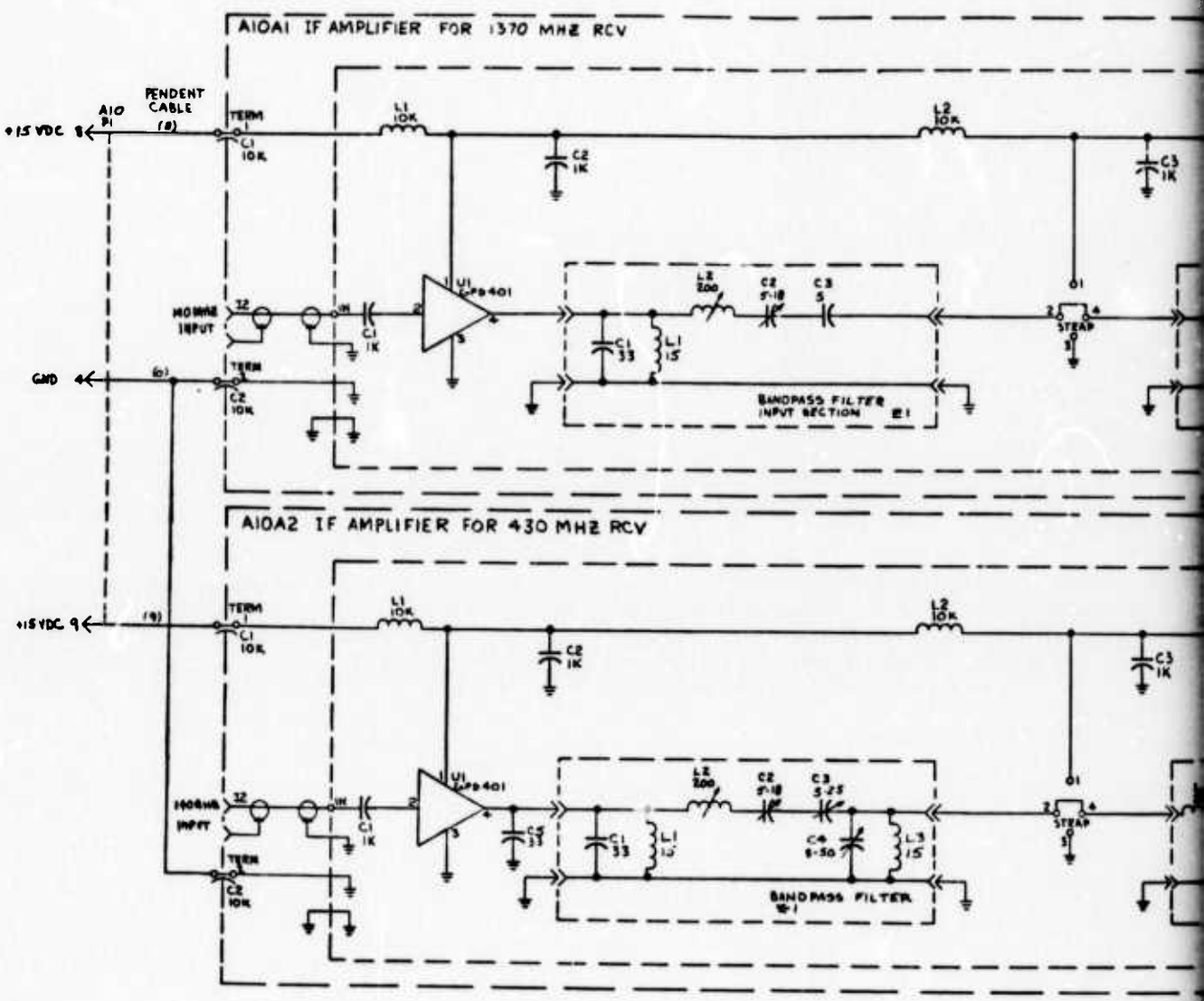
A10 - IF AMPL.

NOTES:

1. ALL CAPACITORS ARE IN PF
2. ALL INDUCTORS ARE IN UH
3. GPD 401/402 BOTTOM VIEW

1. +15 VDC
2. RF INPUT
3. GND
4. RF OUTPUT

4. PENDENT CABLE NO. 22 TEFLON WIRE. (NO) REPRESENTS COLOR CODE.

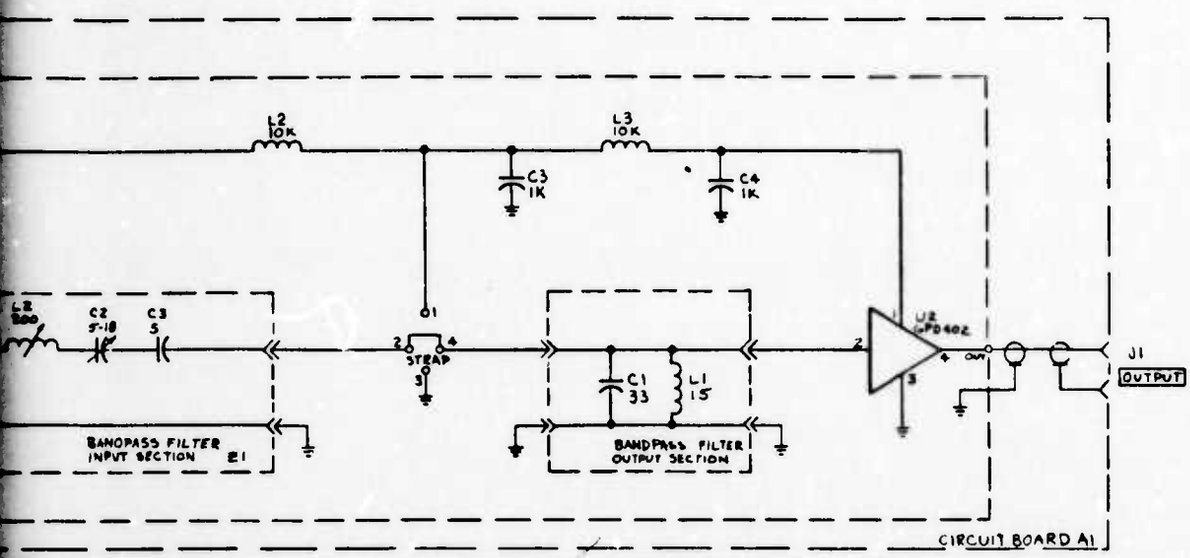


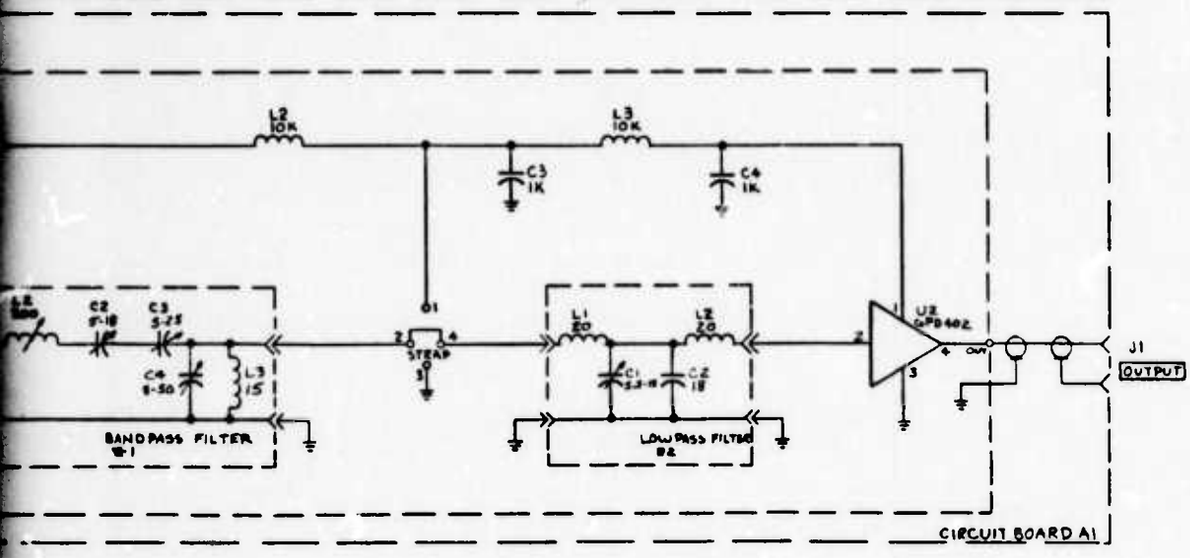
NEXT ASSY:

TYPE NO:

A

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED



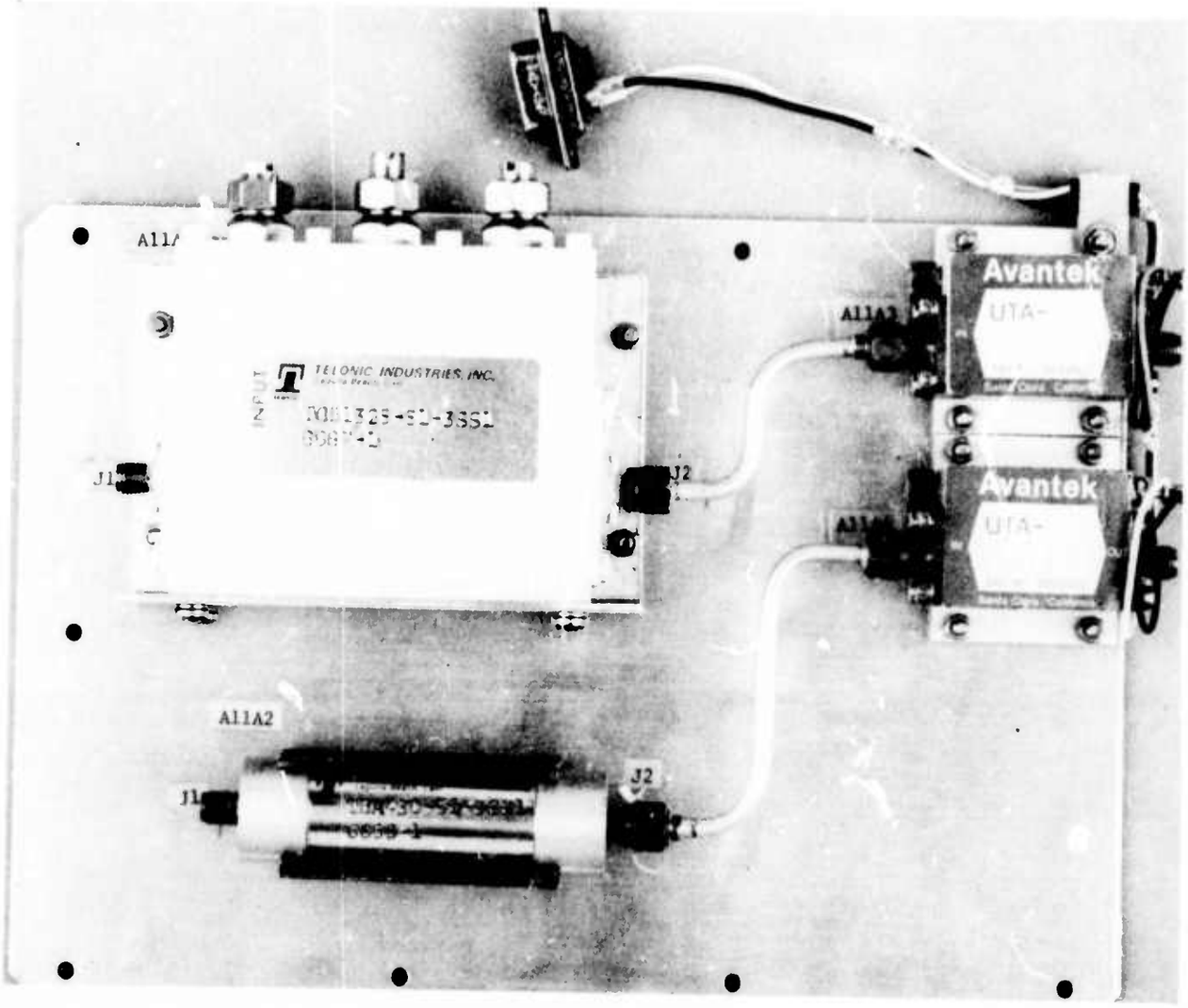


-001

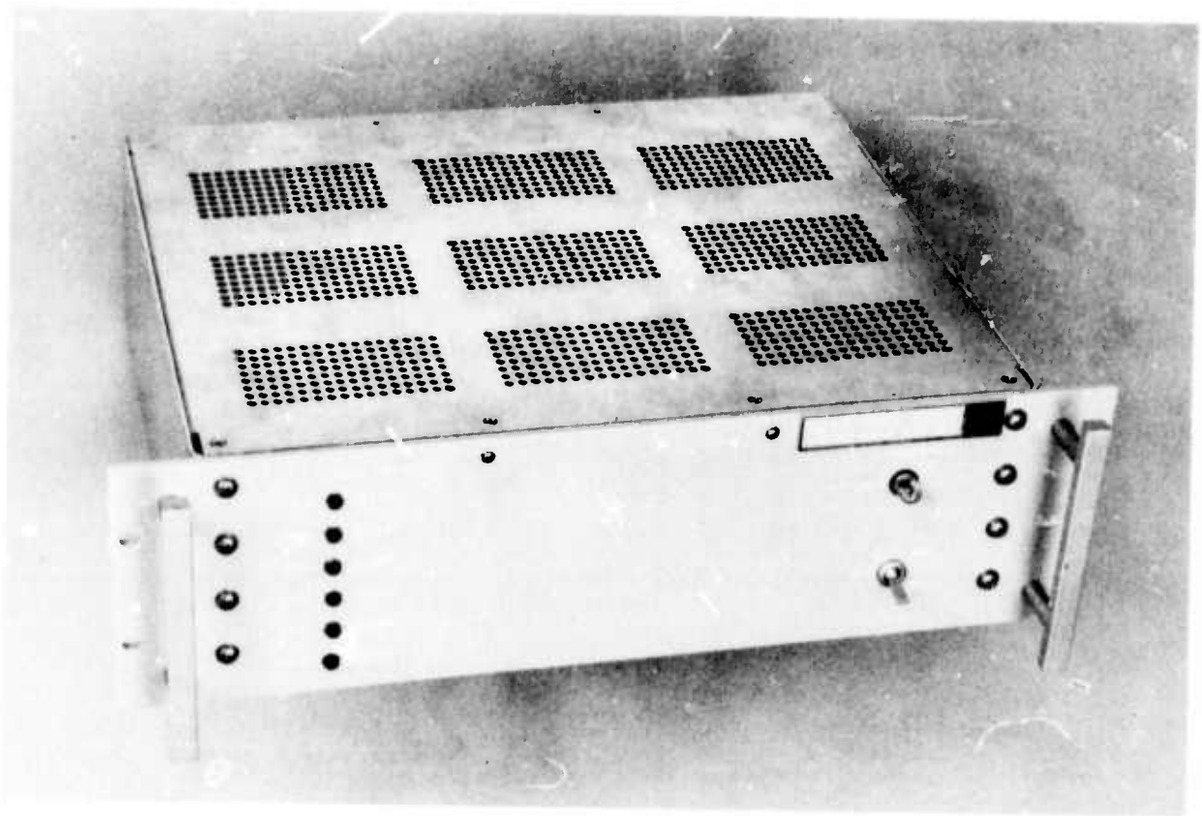
MATERIAL	UNLESS OTHERWISE SPECIFIED	CONTRACT NO	COLLINS RADIO COMPANY
FINISH	DIMENSIONS ARE IN INCHES; TOL ON DEC DIM.: .XX = ±.02, .XXX = ±.008 HOLE DIAMETERS: UNDER .251 DIA = +.005 -.005 .251 TO .500 DIA = +.006 -.005 OVER .500 DIA = +.008 -.005 ANGLES: ±1.0° ECCENTRICITY BETWEEN DIA ON AN AXIS NOT TO EXCEED .010 DIA	PREP TFITE 11-3-71	DALLAS TEX NEWPORT BEACH CALIF CEDAR RAPIDS IA
	PART SHALL COMPLY TO SHOP STD 001	CHK	SCHEMATIC DIAGRAM
		APVD	A DAL, RIGA2 140MHZ IF AMPLIFIER PACKET RADIO TEST RCVR
			SIZE D CODE IDENT 13499 DWG NO 627-9560
			SCALE SHEET

PRO ☐ NFP ☐ RE- ☐ REV__ TC__ CR__ NB__ DL__ TO__

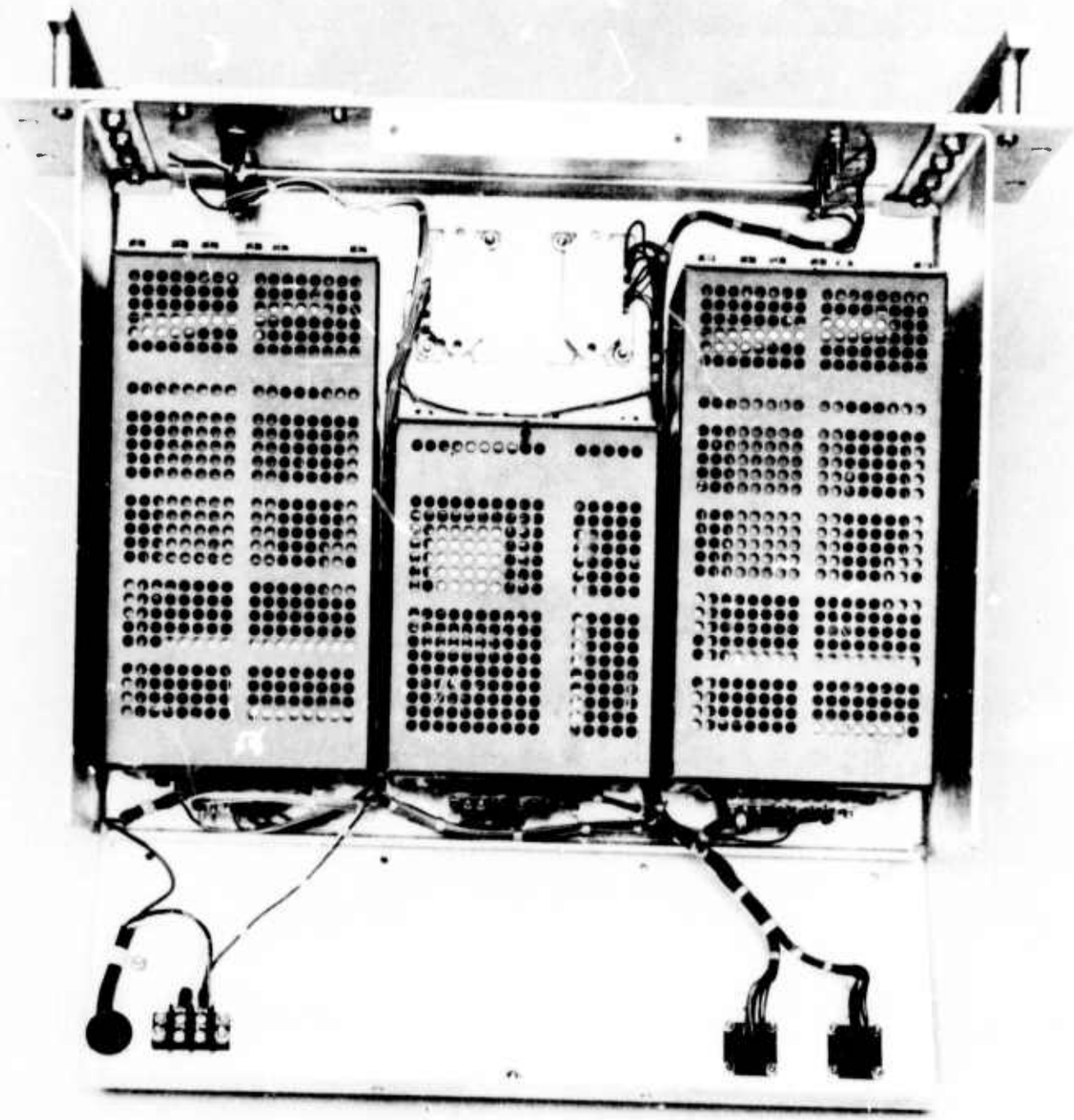
B



A11 - RF AMPL & FILTER



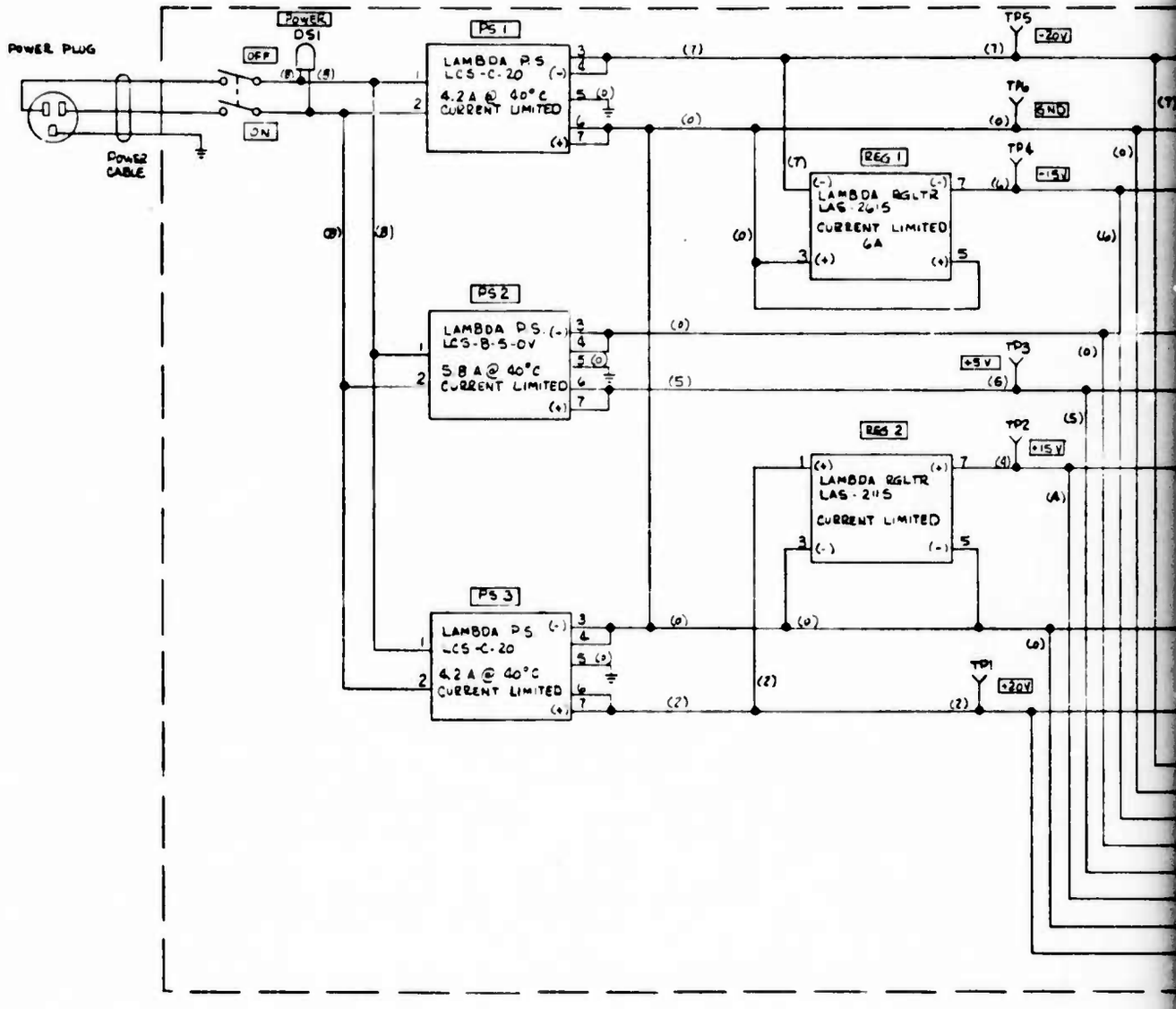
Front View



Internal Assy

NOTES:

1. ALL CHASSIS ITEMS TO BE IDENTIFIED BY RUBBER STAMP OR OTHER MEANS ON CHASSIS.
2. NO 20 TEFLON WIRE TO BE USED UNLESS OTHERWISE NOTED. (X) INDICATE WIRE COLOR CODE.

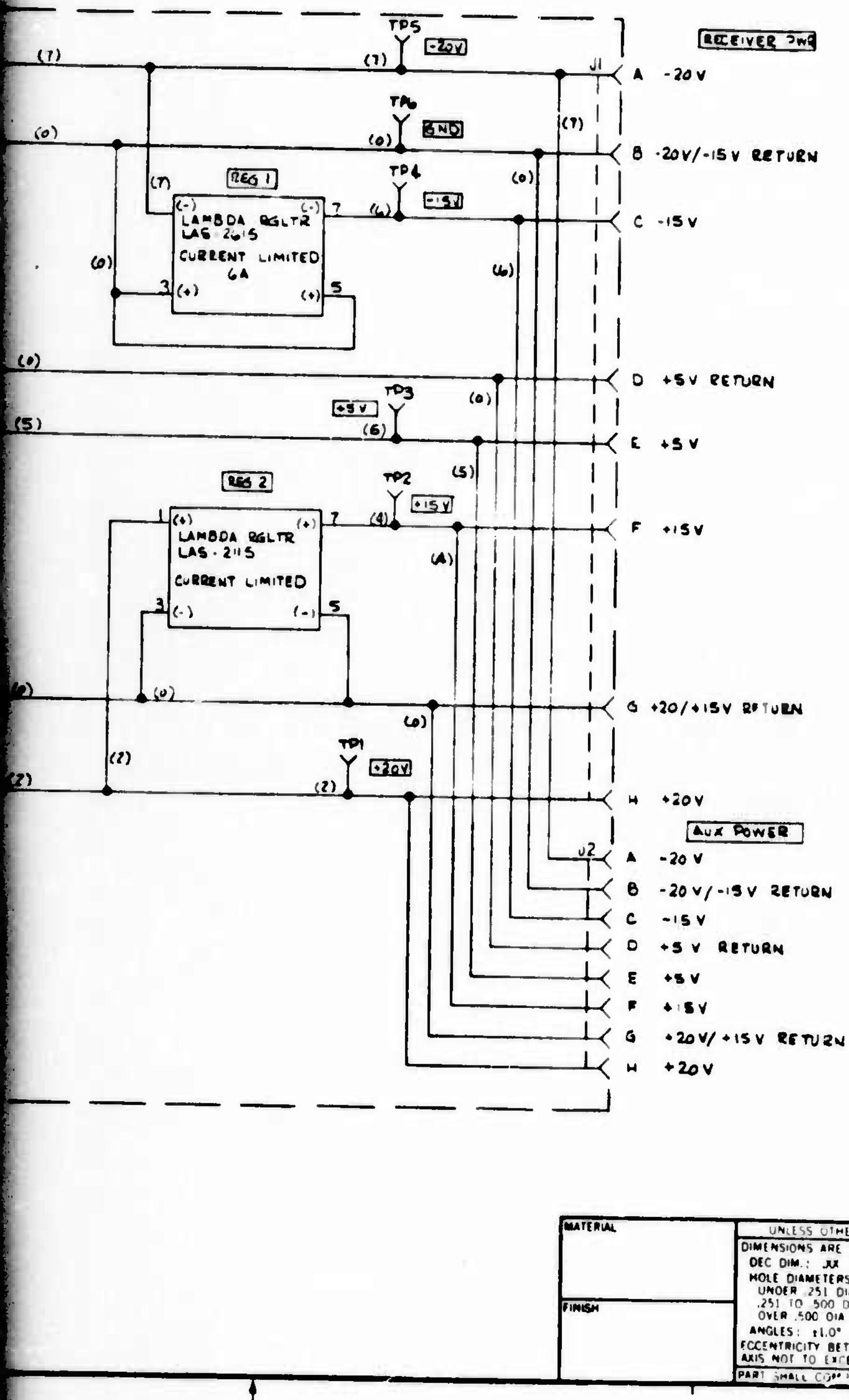


NEXT ASSY

TYPE NO

A

LTR	DESCRIPTION	DATE	APPROVED



-001

MATERIAL

FINISH

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES, TOL ON DEC DIM.: .XX = ±.02, .XXX = ±.008
HOLE DIAMETERS:
UNDER .251 DIA +.005 -.005
.251 TO .500 DIA +.006 -.005
OVER .500 DIA +.008 -.005
ANGLES: ±1.0°
ECCENTRICITY BETWEEN DIA ON AN AXIS NOT TO EXCEED .010 FIR

CONTRACT NO
PREP J M R_EY 11-5-73
CHK
APVD

COLLINS RADIO COMPANY
DALLAS TEX · NEWPORT BEACH CALIF · CEDAR RAPIDS IA

WIRING DIAGRAM
RCVR POWER SUPPLY
PACKET RADIO TEST SET

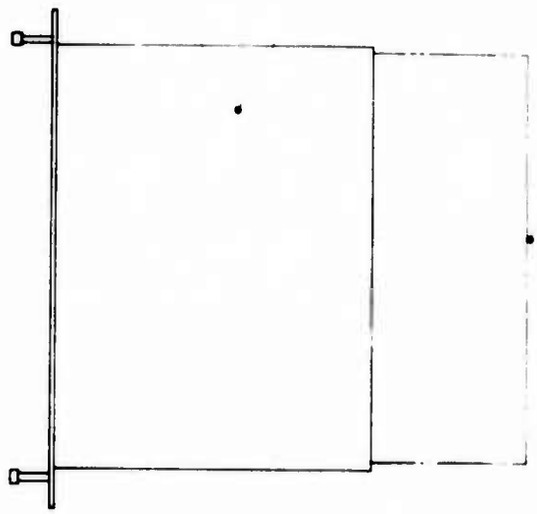
SIZE D | CODE IDENT 13499 | DWG NO 627-9653
SCALE | SHEET

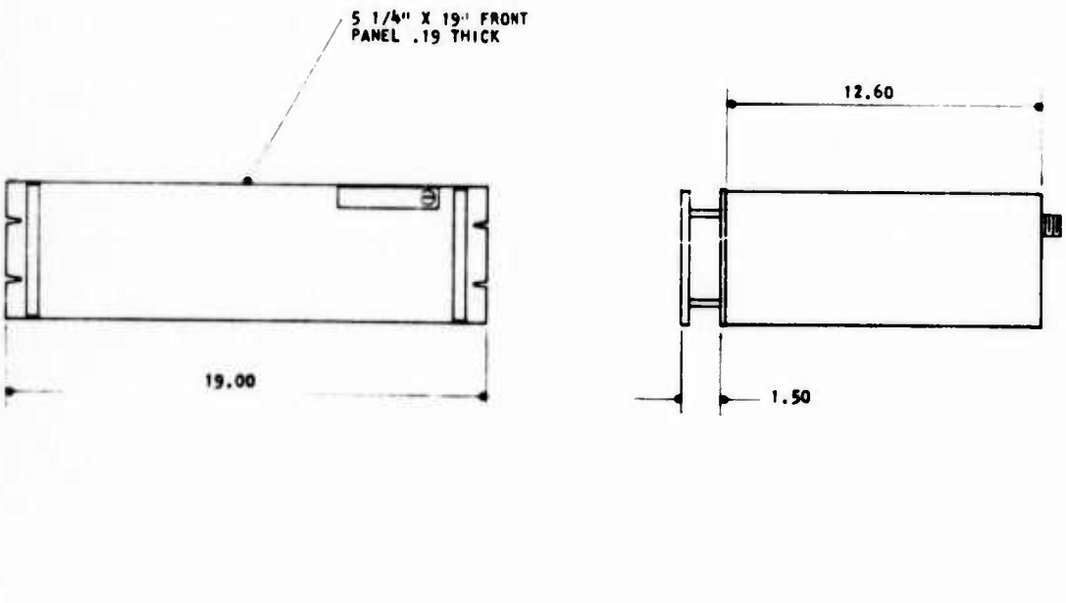
B

NOTES:

1. UNIT WEIGHT IS 34 POUNDS.
2. POWER REQUIRED IS 110V AC WATTS.
3. PART NUMBER FOR THIS UNIT IS o27-9555-001.

LTR





QTY	ITEM NO.	PART OR IDENTIFYING NO	NAME
	DASH NO		PA

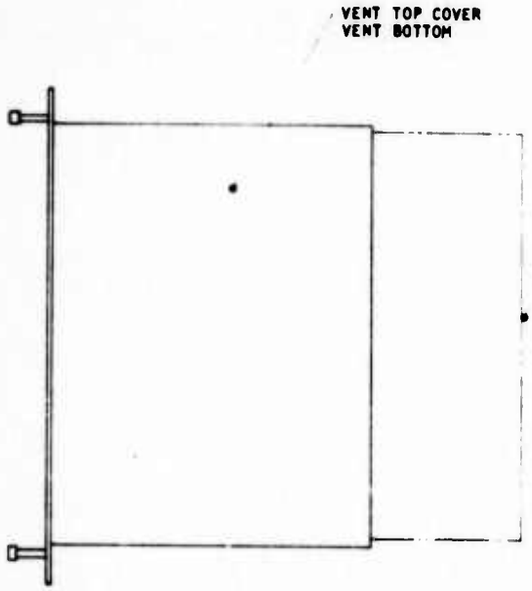
MATERIAL: N/A	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES; TOL ON DEC DIM.: XX = ±.02, XXX = ±.008 HOLE DIAMETERS: UNDER .251 DIA = +.005-.005 .251 TO .500 DIA = +.006-.005 OVER .500 DIA = +.008-.005 ANGLES: ±1.0° ECCENTRICITY BETWEEN DIA ON AN AXIS NOT TO EXCEED .010 DIA PART SHALL COMPLY TO 580-5400-001	CONTRACT NO. PREP D. DELFELD CHK APVD R.A. Herrick
FINISH: N/A		

NEXT ASSY: TYPE NO:

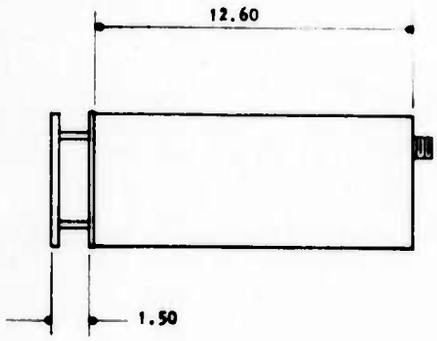
A

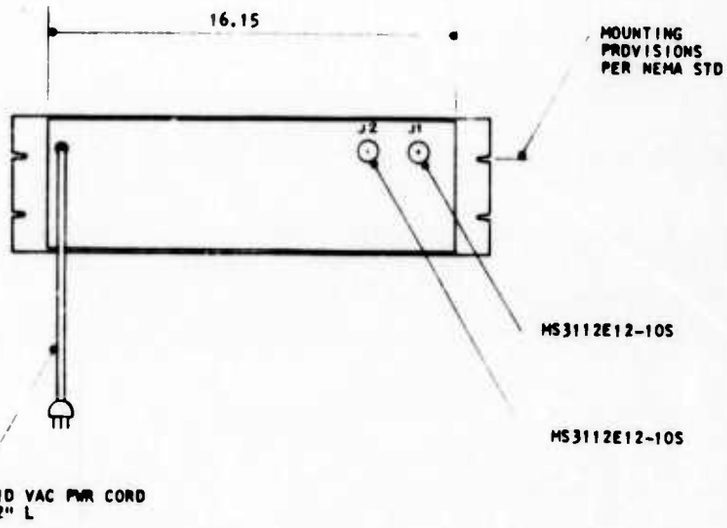
B

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED



" FRONT
THICK



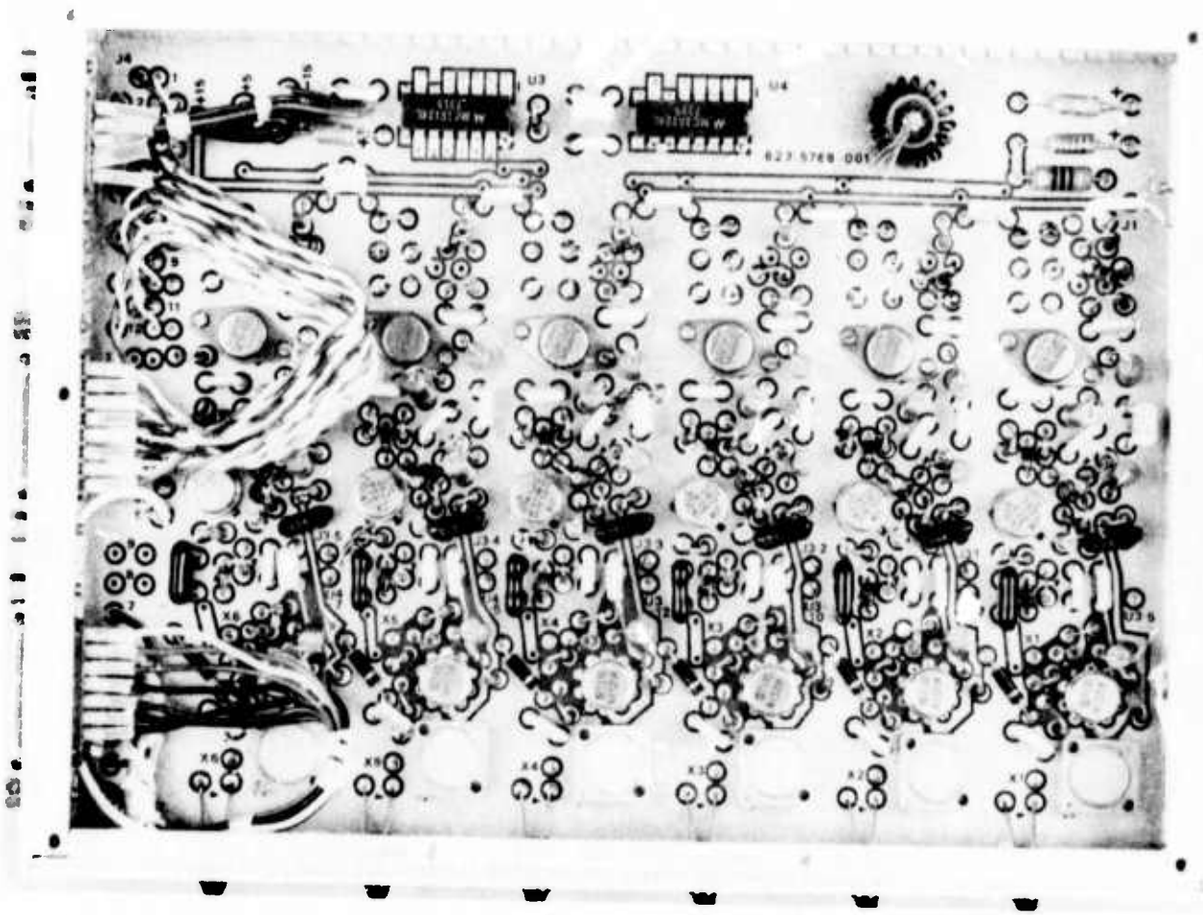


QTY	ITEM NO.	PART OR IDENTIFYING NO	NAME	DESCRIPTION	UM	MN	ALTN PREF
	DASH NO.		PARTS LIST				

MATERIAL: N/A	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES; TOL ON DEC DIML: .XX = ±.02, .XXX = ±.008 HOLE DIAMETERS: UNDER .251 DIA = +.005-.005 .251 TO .500 DIA = +.006-.005 OVER .500 DIA = +.008-.005 ANGLES: ±1.0° ECCENTRICITY BETWEEN DIA ON AN AXIS NOT TO EXCEED .010 DIA PART SHALL COMPLY TO 580-5400-001	CONTRACT NO. PREP D. DELFELD 11/19/73 CHK APVD A. A. Herrick	COLLINS RADIO COMPANY DALLAS, TEX NEWPORT BEACH, CALIF CEDAR RAPIDS, IA RECEIVER POWER SUPPLY- OUTLINE & INSTALLATION, PACKET RADIO TEST SET SIZE C · CODE IDENT 13499 · DWG NO 627-9574 SCALE 1/4 · SHEET
FINISH: N/A			

FRO ☐ NFP ☐ REL ☐ REV__ TC__ CR__ NB__ DL__ TO__

B

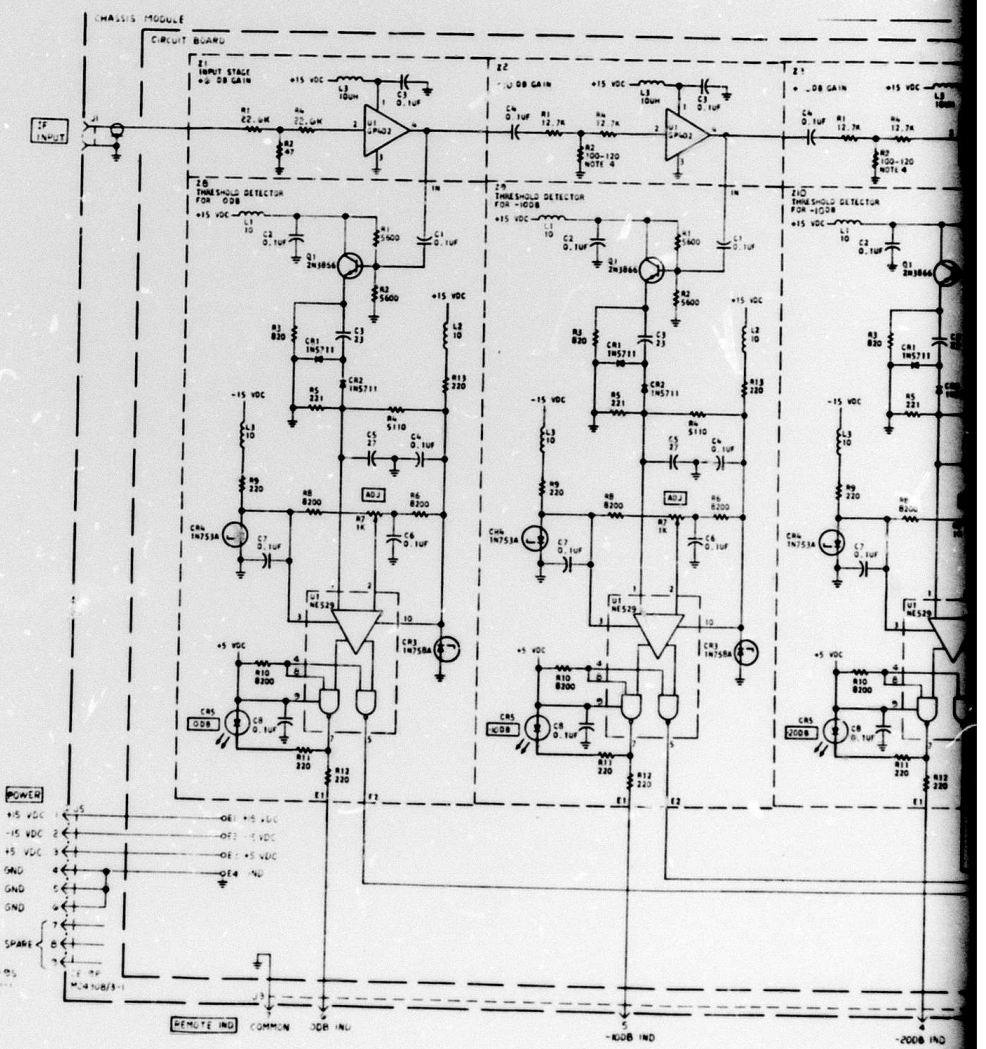


Assembly

NOTES:

1. UNLESS OTHERWISE SPECIFIED
   ALL RESISTANCE VALUES ARE IN OHMS
   ALL RESISTORS ARE 1/4 W 10%
   ALL CAPACITANCE VALUES ARE IN PICOFARADS
   ALL INDUCTANCE VALUES ARE IN MICROHENRIES
2. U1 & U2 MC10124 ARE TTL TO MECL TRANSLATORS SUGGESTED APPLICATION IS TO USE TWISTED PAIR TO A MC10115/10116 DIFFERENTIAL RECEIVING DEVICE
3. U3 LM320-5V DC REGULATOR BOTTOM VIEW TO 5 CAN

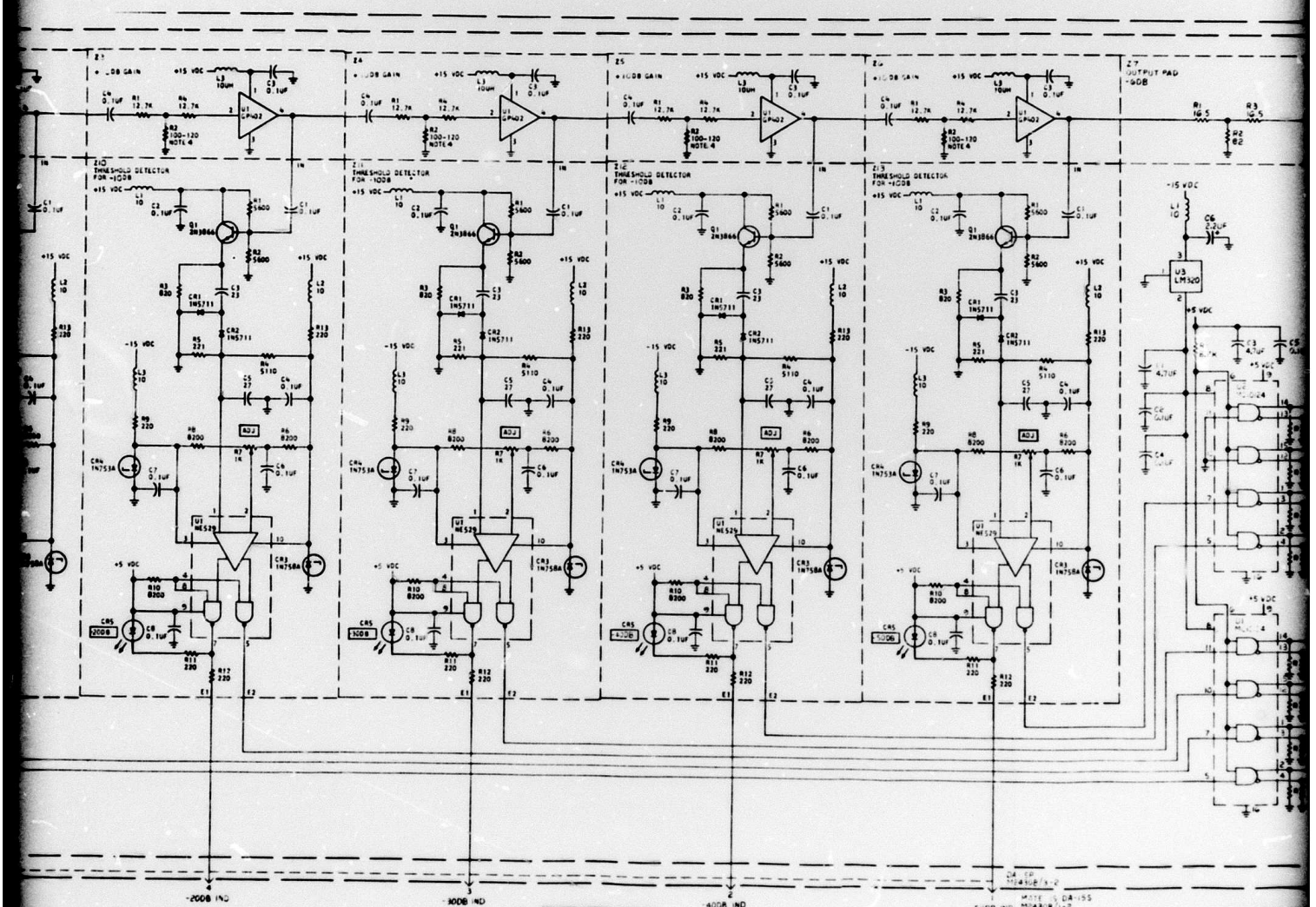
4. RESISTOR SELECTED FOR 100X STAGE GAIN
5. RESISTORS MARKED "W" ARE 47 OHMS, 1/2 WATT



PART NUMBER	FRAME
127-3642	1/3

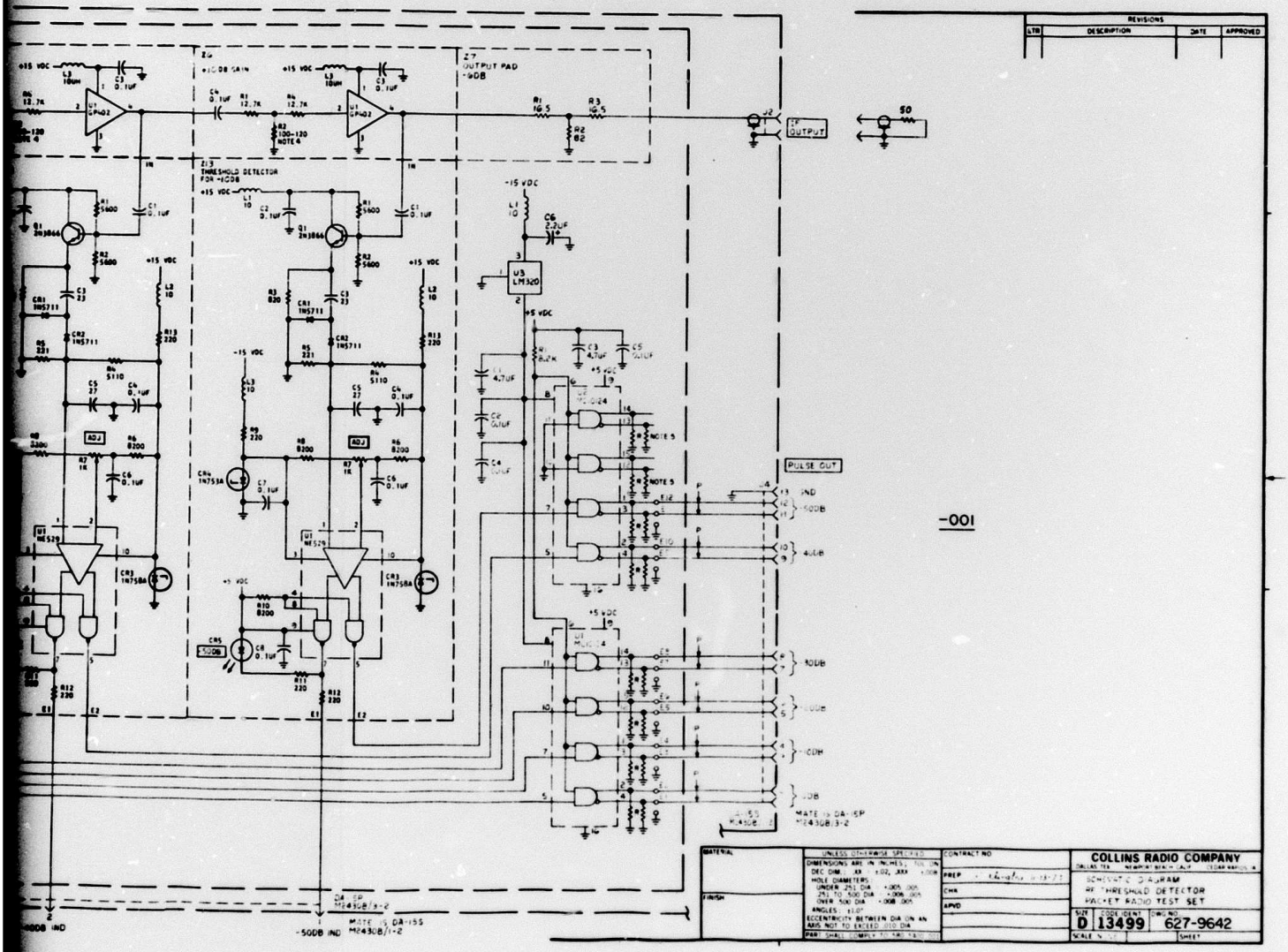
PART NUMBER	FRAME
127-3642	2/3

A



B

PART NUMBER	FRAME
627-3642	1/3


REVISIONS
LTR
DESCRIPTION
DATE
APPROVED
A7
OUTPUT PAD
-90B
A3
THRESHOLD DETECTOR
FOR -10DB
+15 VDC
-15 VDC
+5 VDC
J2
RF OUTPUT
50
PULSE OUT
-001
-50B IND
-40B
-20B
-10B
-5B
-2B
-1B
MATE-N-DA-15P
ME430B/3-2
MATE-N-DA-15S
ME430B/1-2
COLLINS RADIO COMPANY
SCHEMATIC DIAGRAM
RF THRESHOLD DETECTOR
PACKET RADIO TEST SET
SIZE D
CODE IDENT 13499
DWG NO 627-9642
SHEET

4A-83/4A-84

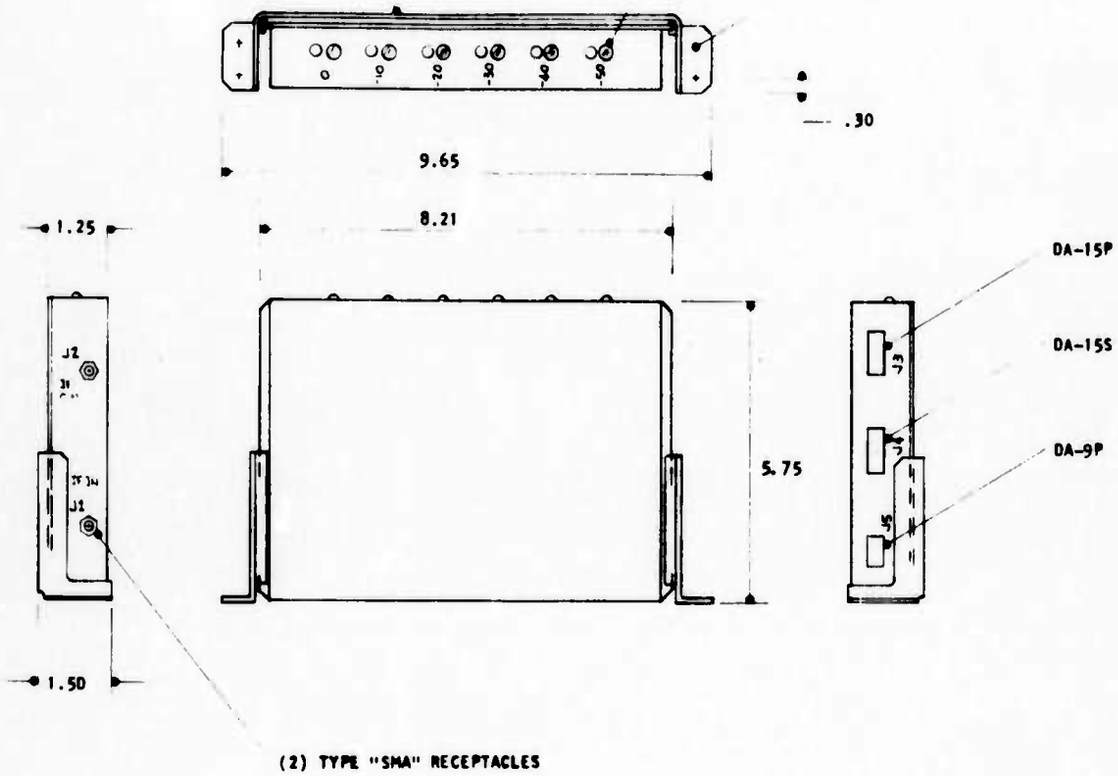
NOTES:

1. WEIGHT OF UNIT IS 2 POUNDS.
2. POWER REQUIRED IS WATTS ± 15, +5VDC.
3. PART NUMBER OF MODULE IS 627-9564-001.

627-9459-001 BRACKET
(2) 35-1B-2-5-3 CLIPS (BIRTCHER)

(6) LIGHT EMITTING DIODES
(6) CKT ADJ POTS

.125 DIA, 4 HOLES
PATTERN: .60 X 9.05



(2) TYPE "SMA" RECEPTACLES

QTY	ITEM NO.	PART OR IDENTIFYING NO	NAME
	DASH NO.		

MATERIAL	UNLESS OTHERWISE SPECIFIED	CONTRACT NO.
N/A	DIMENSIONS ARE IN INCHES; TOL ON DEC DIM.: XX = ±.02, XXX = ±.008 HOLE DIAMETERS: UNDER .251 DIA = +.005-.005 .251 TO .500 DIA = +.006-.005 OVER .500 DIA = +.008-.005 ANGLES: ±1.0° ECCENTRICITY BETWEEN DIA ON AN AXIS NOT TO EXCEED .010 DIA	PREP O. DELFELD
FINISH		CHK
N/A		APVD
	PART SHALL COMPLY TO 580-5400-001	

NEXT ASSY:

TYPE NO:

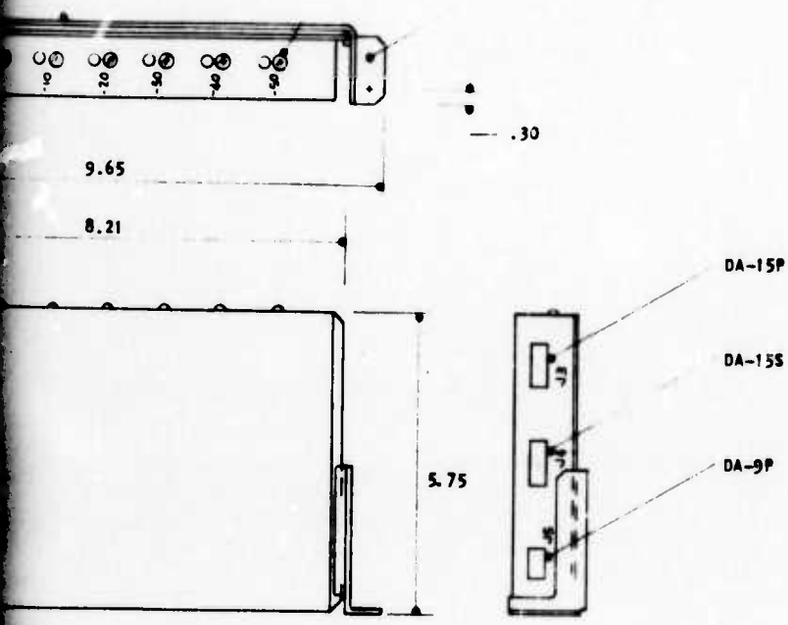
A

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED

99-001 BRACKET
-1B-2-5-3 CLIPS (BIRTCHER)

(6) LIGHT EMITTING DIODES
(6) CKT ADJ POTS

.125 DIA, 4 HOLES
PATTERN, .60 X 9.05



E "SMA" RECEPTACLES

1/4 SIZE MODULE

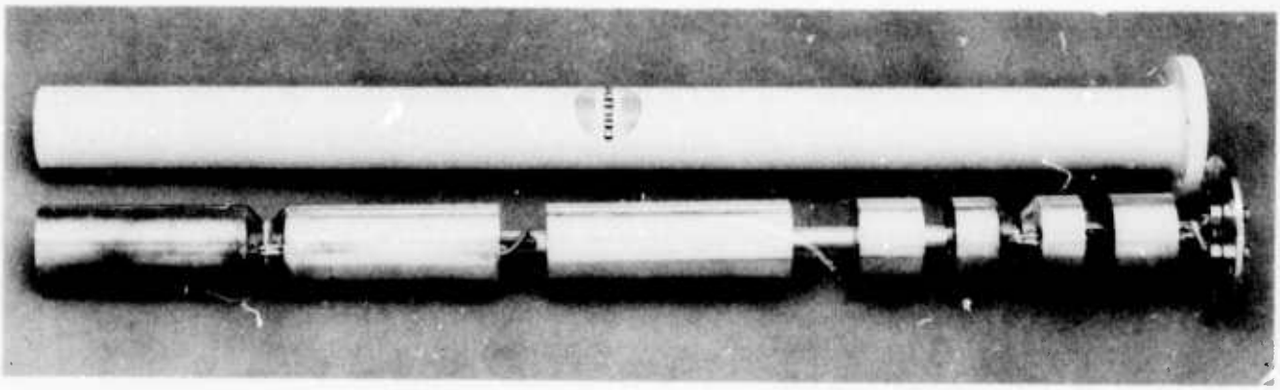
QTY	ITEM NO.	PART OR IDENTIFYING NO	NAME	DESCRIPTION	UM	MN	ALTN PREF
	DASH NO.						

PARTS LIST

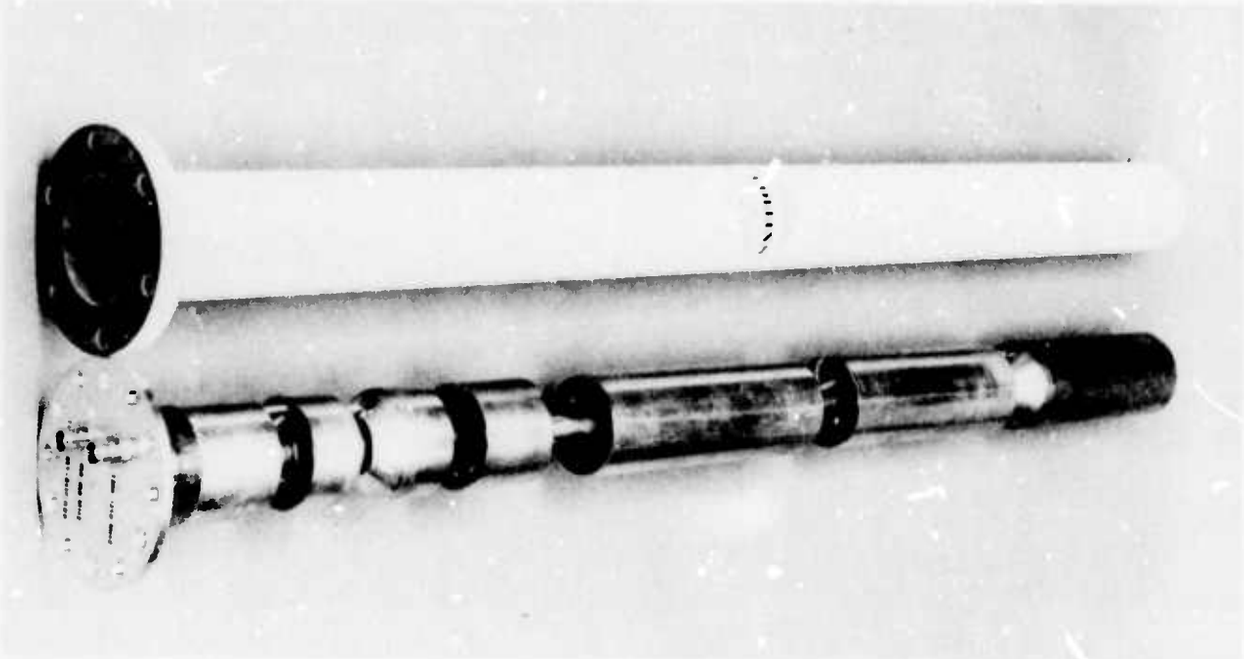
MATERIAL N/A	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES; TOL ON DEC DIM.: .XX = ±.02, .XXX = ±.008 HOLE DIAMETERS: UNDER .251 DIA = +.005 -.005 .251 TO .500 DIA = +.006-.005 OVER .500 DIA = +.008-.005 ANGLES: ±1.0° ECCENTRICITY BETWEEN DIA ON AN AXIS NOT TO EXCEED .010 DIA PART SHALL COMPLY TO 580-5400-001	CONTRACT NO.	COLLINS RADIO COMPANY DALLAS, TEX NEWPORT BEACH, CALIF CEDAR RAPIDS, IA
FINISH N/A		PREP D. DELFELD 11/20/73 CHK APVD	THRESHOLD, DETECTOR MODULE - OUTLINE & INSTALLATION PACKET RADIO TEST SET
			SIZE C · CODE IDENT 13499 · DWG NO. 627-9583
			SCALE 1/2 & NOTED · SHEET

FRO ☐ NFP ☐ REL ☐ REV__ TC__ CR D NB D DL 2 TO D

B



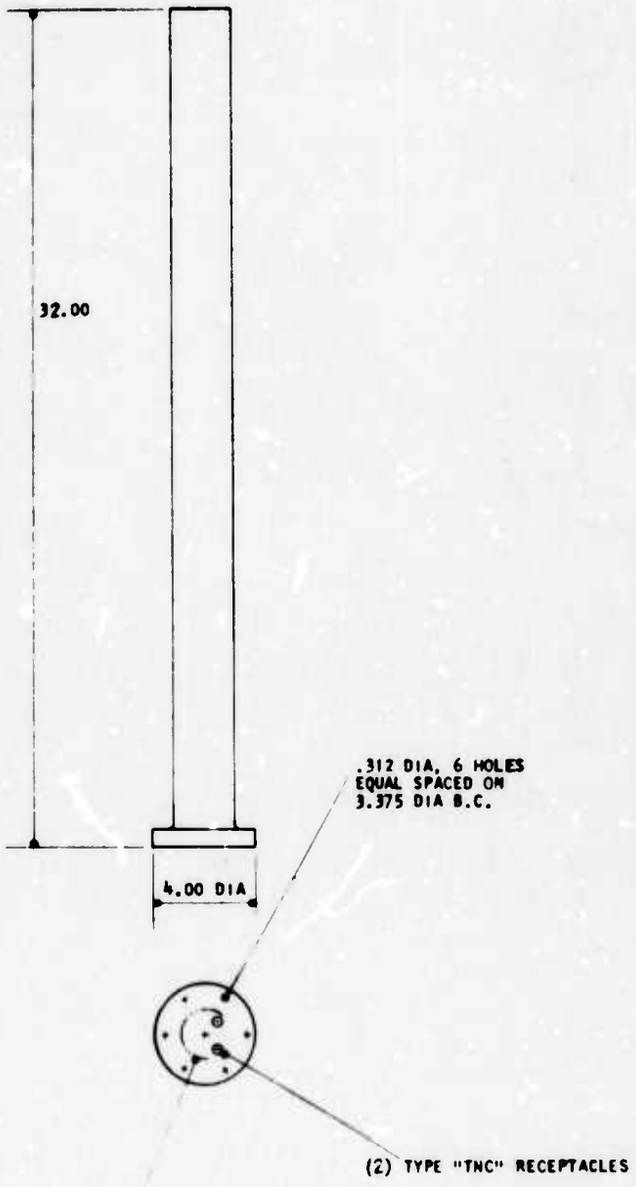
Assembly



Assembly

NOTES:

1. WEIGHT OF THIS UNIT IS 8 POUNDS.
2. NO POWER IS REQUIRED.
3. PART NUMBER FOR THIS UNIT IS 627-8137-001, SERIAL NUMBERS 001 & 002.



QTY	ITEM NO	PART OR IDENTIFYING NO
	DASH NO	

MATERIAL	UNLESS OTHERWISE SPECIFIED	CONTRACT NO.
N/A	DIMENSIONS ARE IN INCHES; TOL ON DEC DIM.: .XX = ±.02, .XXX = ±.008 HOLE DIAMETERS: UNDER .251 DIA = +.005-.005 .251 TO .500 DIA = +.006-.005 OVER .500 DIA = +.008-.005 ANGLES: ±1.0° ECCENTRICITY BETWEEN DIA ON AN AXIS NOT TO EXCEED .010 DIA	PREP O. OELFEL CHK APVD A. A.
FINISH N/A	PART SHALL COMPLY TO 580-5400-001	

NEXT ASSY: TYPE NO:

A

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED

.312 DIA, 6 HOLES
EQUAL SPACED ON
3.375 DIA B.C.

(2) TYPE "TNC" RECEPTACLES

2" DIA CLEARANCE
RECOMMENDED IN
MOUNTING STRUCTURE

QTY	ITEM NO	PART OR IDENTIFYING NO	NAME	DESCRIPTION	UM	MN	ALTN PREF
	DASH NO			PARTS LIST			

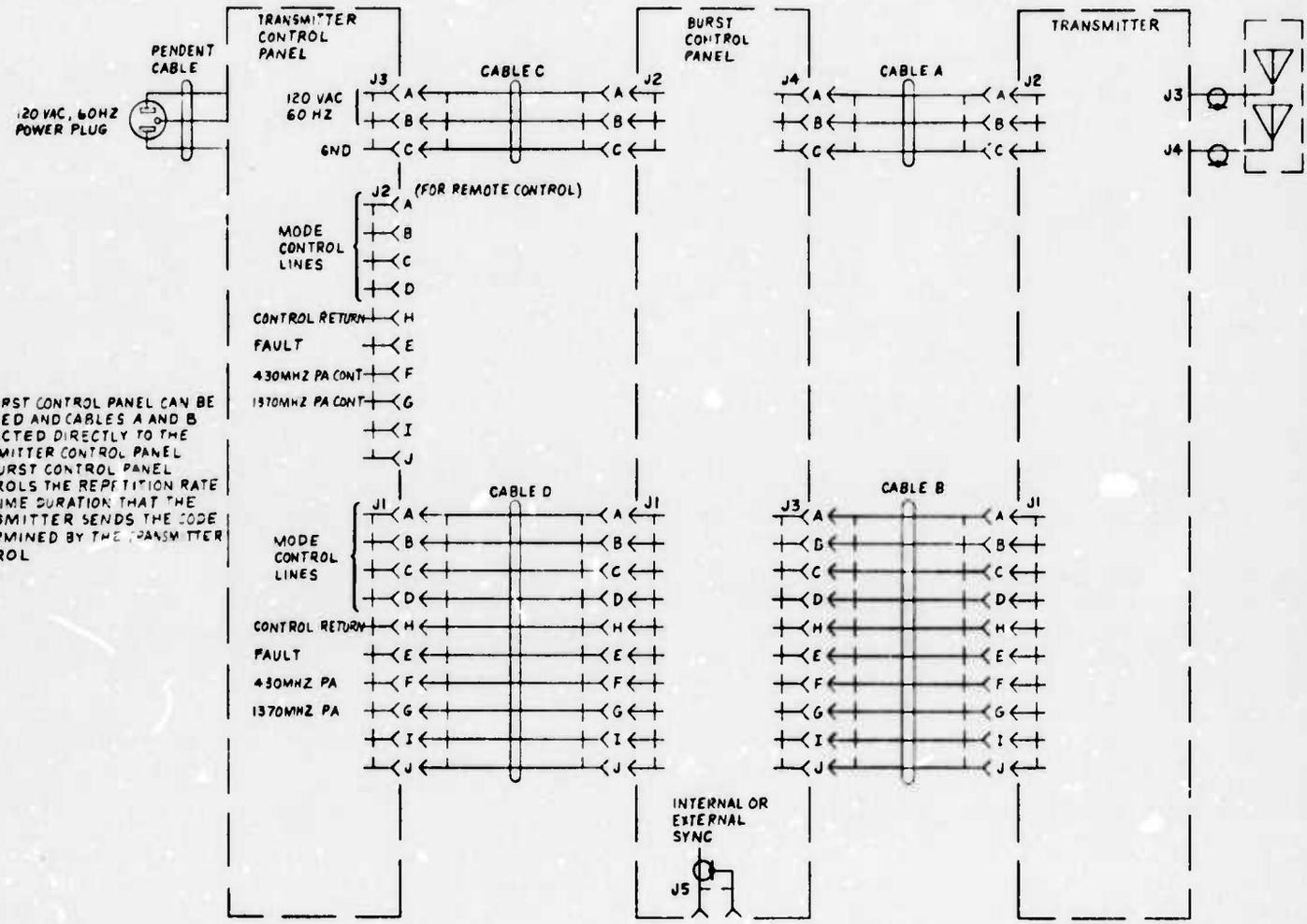
MATERIAL: N/A FINISH: N/A	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES; TOL ON DEC DIM.: .XX = ±.02, .XXX = ±.008 HOLE DIAMETERS: UNDER .251 DIA = +.005-.005 .251 TO .500 DIA = +.006-.005 OVER .500 DIA = +.008-.005 ANGLES: ±1.0° ECCENTRICITY BETWEEN DIA ON AN AXIS NOT TO EXCEED .010 DIA PART SHALL COMPLY TO 580-5400-001	CONTRACT NO. PREP D. DELFEIO 11/20/73 CHK APVD W. A. Hewick	COLLINS RADIO COMPANY DALLAS, TEX NEWPORT BEACH, CALIF CEDAR RAPIDS, IA ANTENNA OUTLINE & INSTALLATION PACKET RADIO TEST SET SIZE C | CODE IDENT 13499 | DWG NO 627-9582 SCALE 1/4 | SHEET

FRO ☐ NFP ☐ REL ☐ REV__ TC__ CR 0 NB 0 DL 2 TO 0

B

4A-89/4A-90

NAME	DATE
REDR	
CHK.	



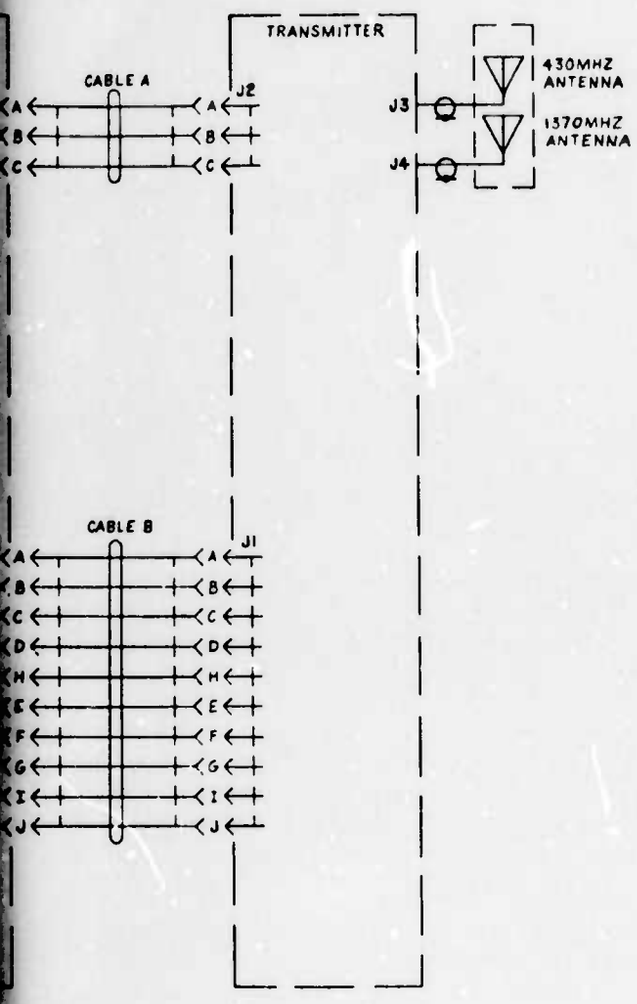
NOTES:
1. THE BURST CONTROL PANEL CAN BE OMITTED AND CABLES A AND B CONNECTED DIRECTLY TO THE TRANSMITTER CONTROL PANEL
2. THE BURST CONTROL PANEL CONTROLS THE REPETITION RATE AND TIME DURATION THAT THE TRANSMITTER SENDS THE CODE DETERMINED BY THE TRANSMITTER CONTROL

-001

NOTES

A

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVAL



PUBLICATIONS DRAWING
REVISIONS TO BE APPROVED AND MADE BY PUBLICATIONS ILLUSTRATING DEPARTMENT

PUB DWG NO				
SIZE	GLIDE & PEN	LINE WT	FINAL SIZE	%

CONTRACT NO

NAME	DATE
DR Rick	3/27/64
CHK	
APPD	

COLLINS RADIO COMPANY
CEDAR RAPIDS, IOWA — DALLAS, TEXAS
NEWPORT BEACH, CALIF — TORONTO, ONTARIO

CABLING DIAGRAM
TRANSMITTER SYSTEM

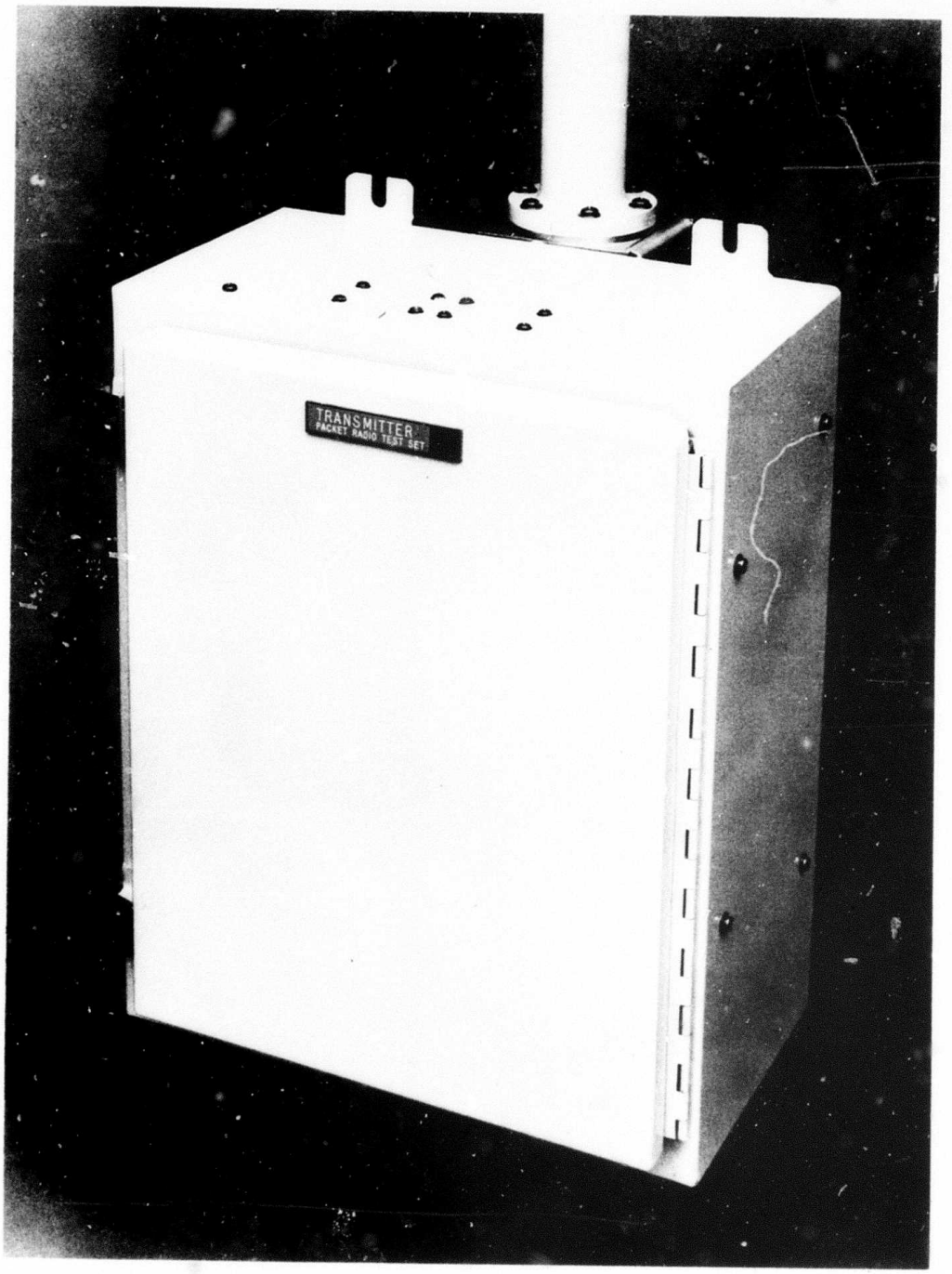
SIZE	CODE IDENT NO	DWG NO
D		63-9567

SCALE / SHEET OF

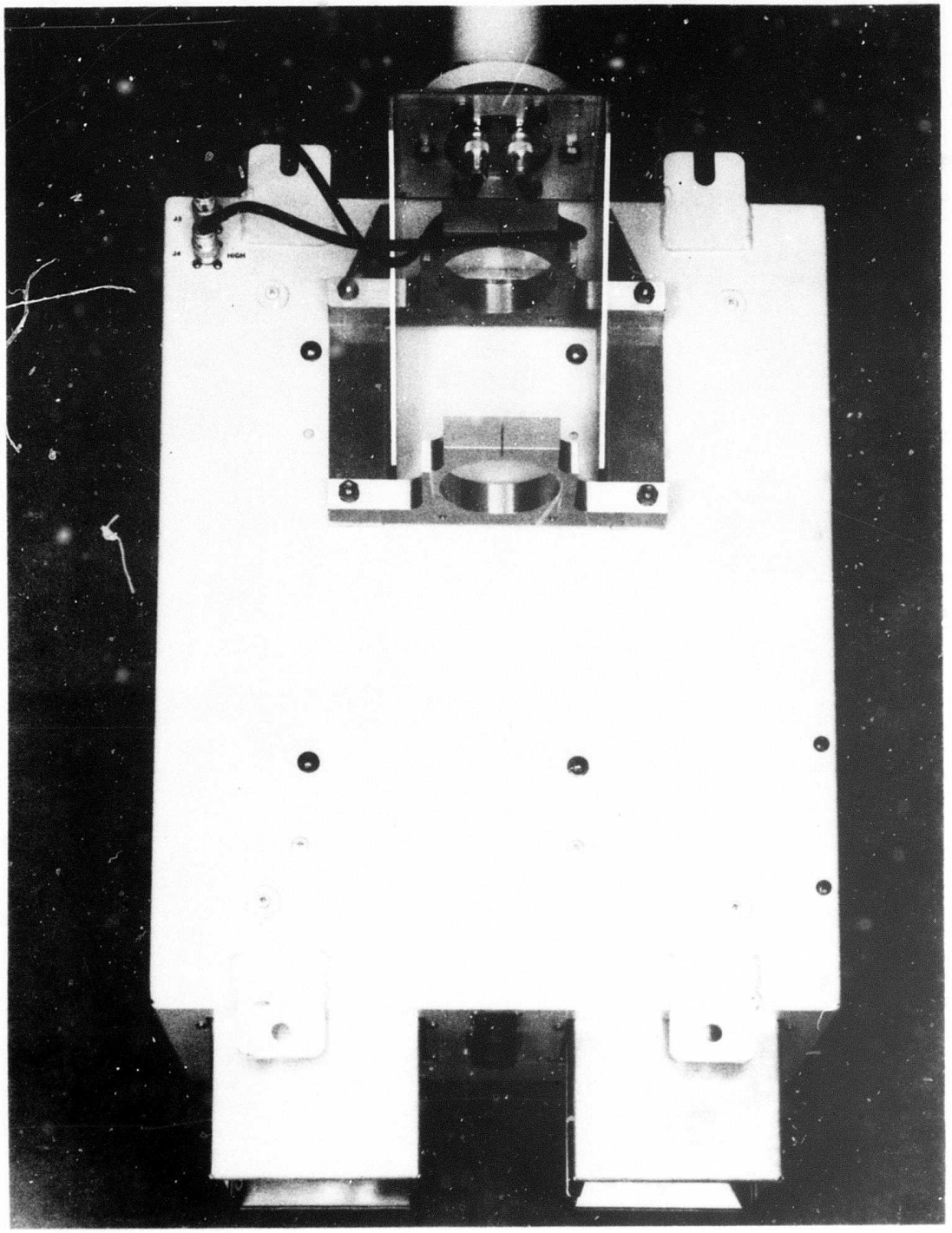
DASH	NEXT ASSY	EQUIP
APPLICAT'D		

REV	DATE	REV	DATE	REV	DATE	REV	DATE	CUST DWG

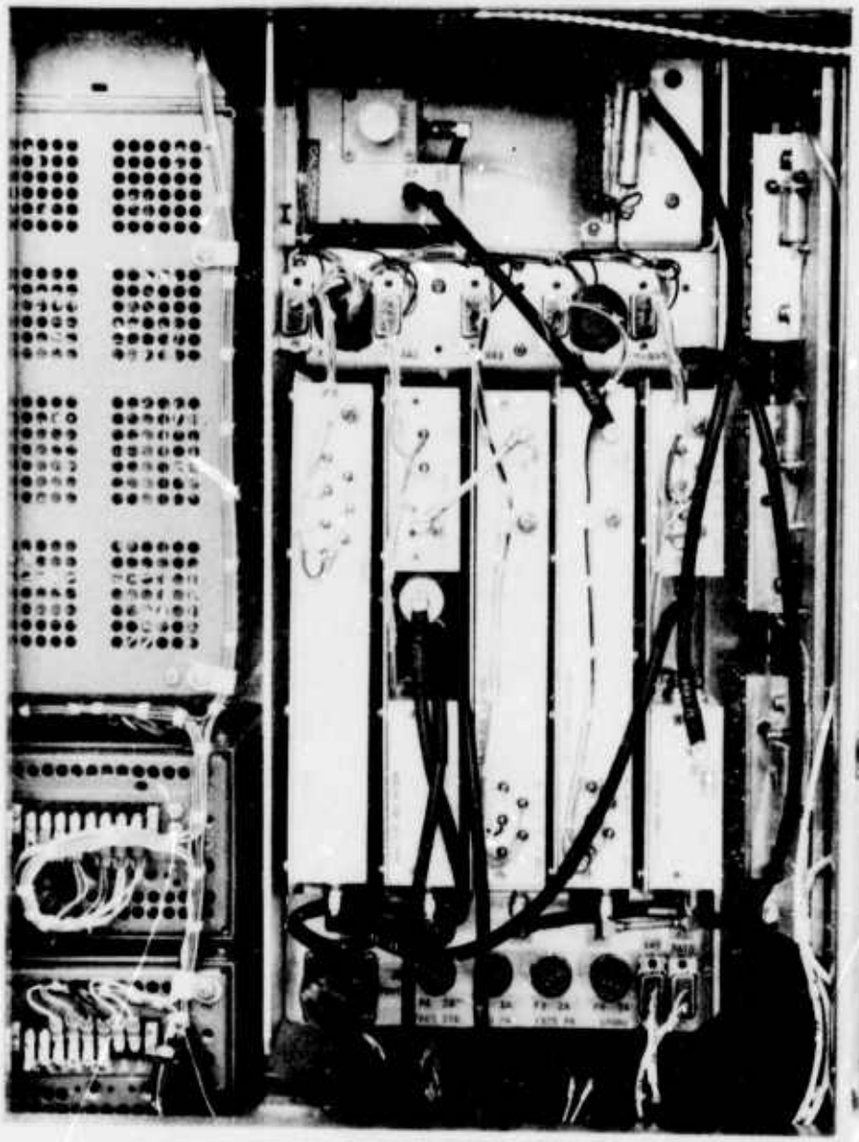
B

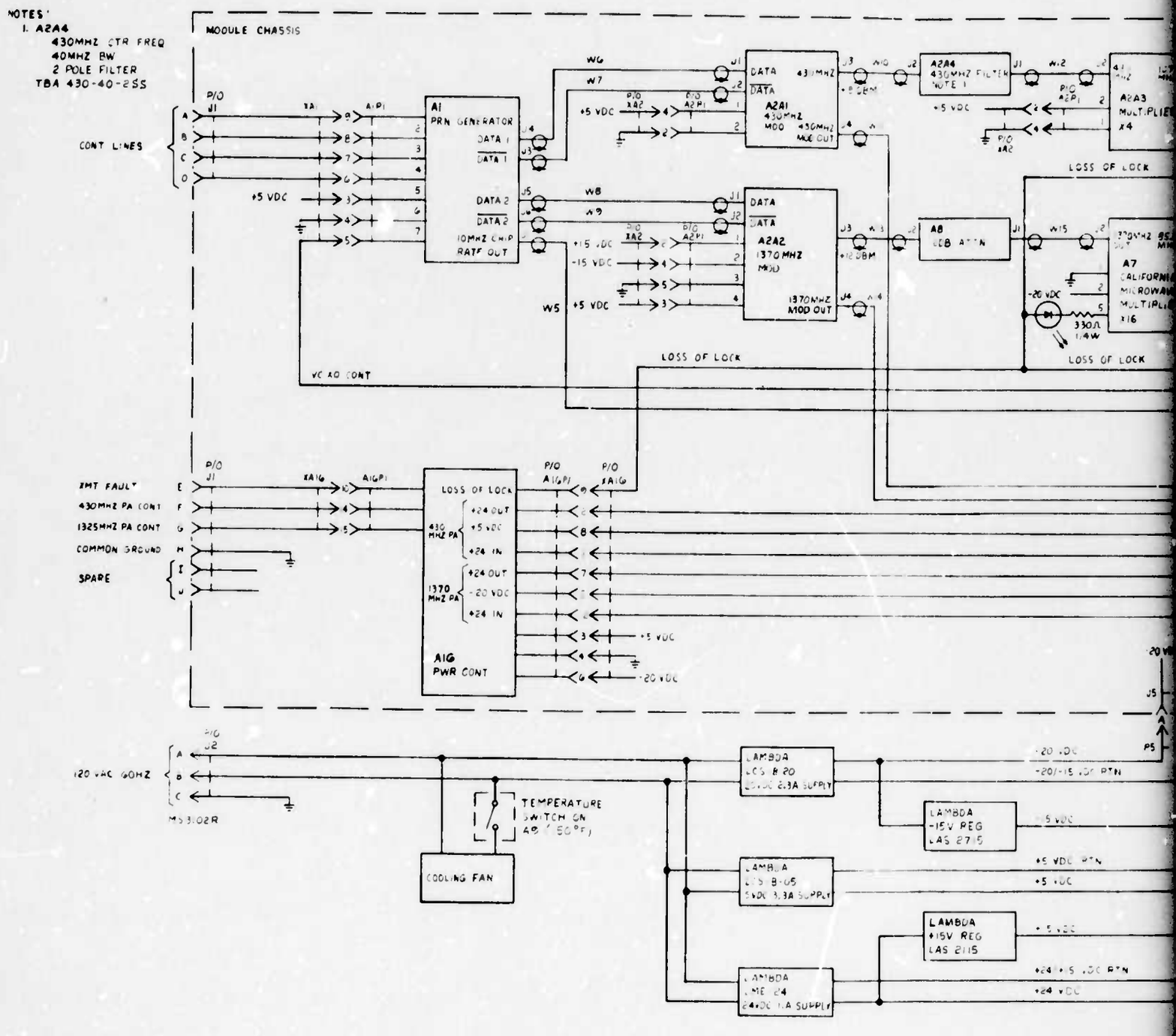


Front View



Rear View

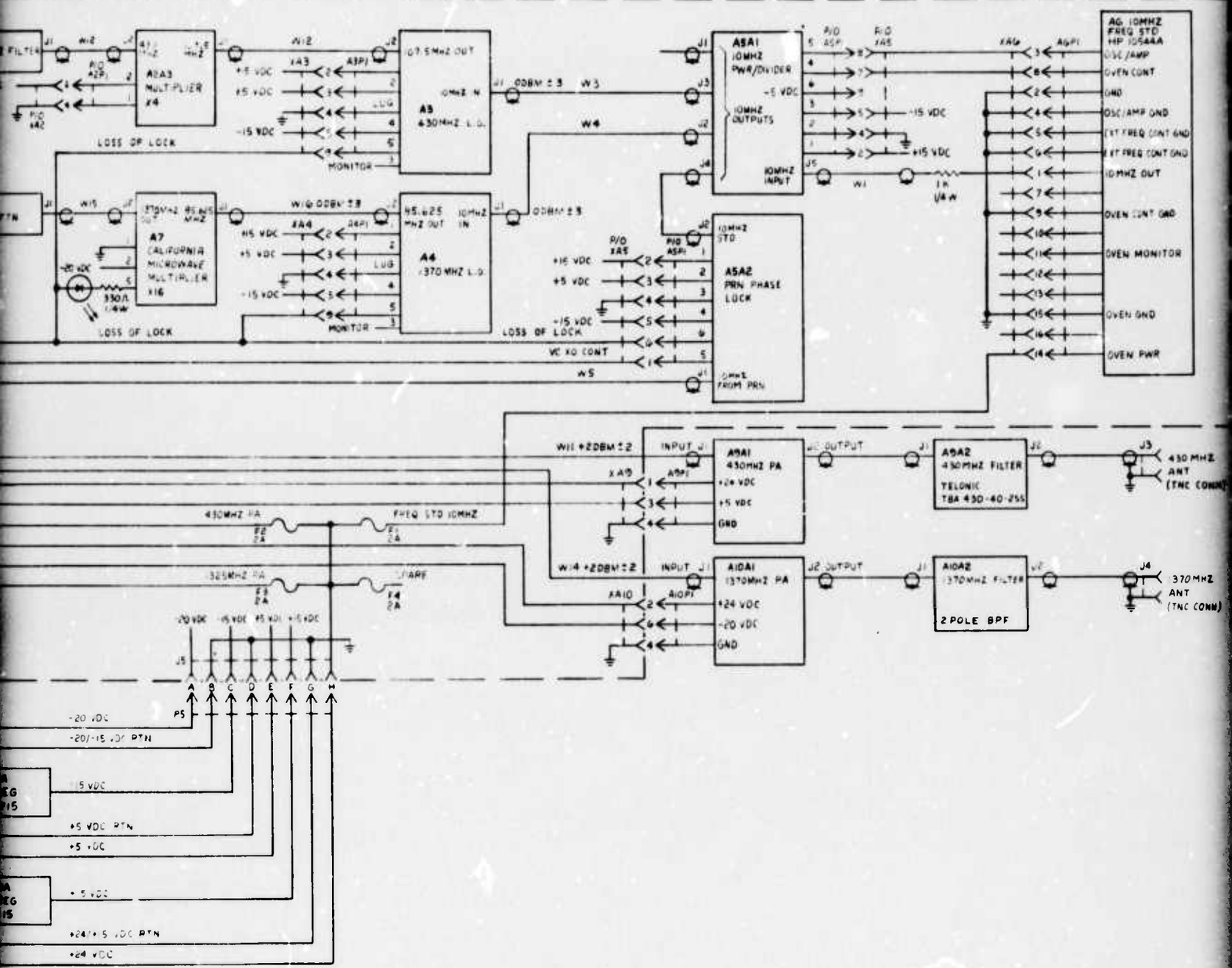




PART NUMBER 627-9588 FAB NO 212

A

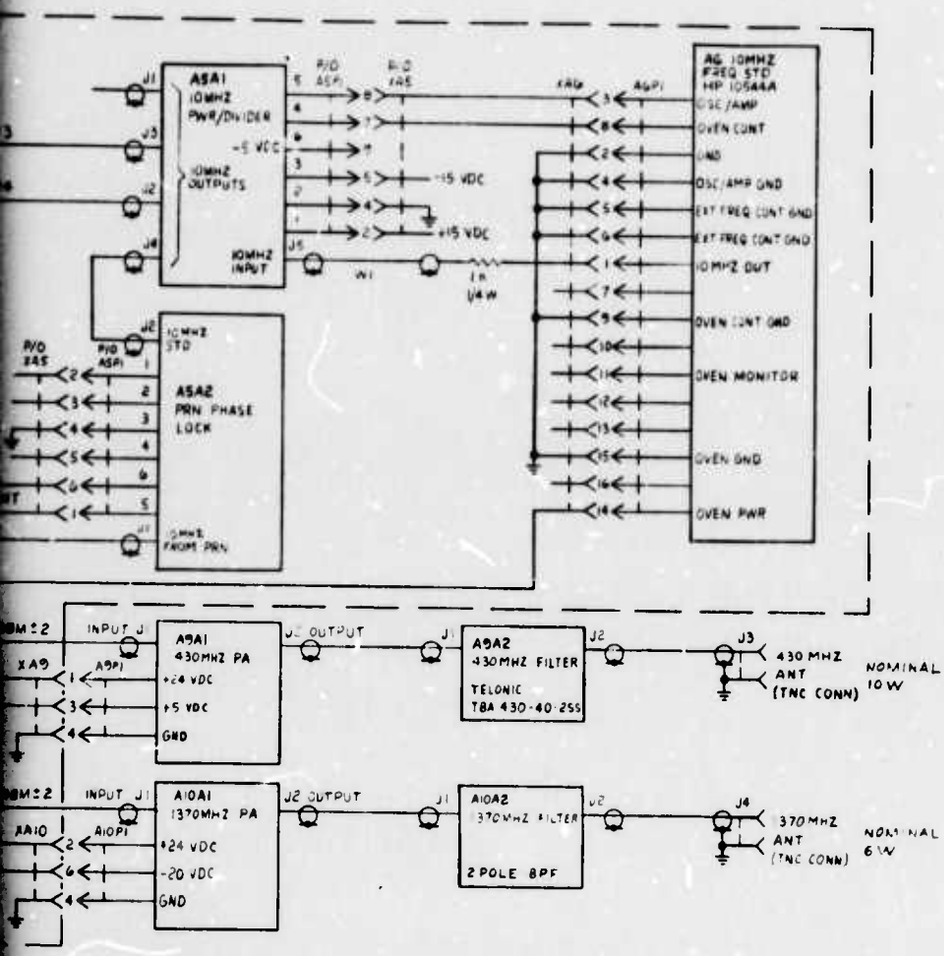
PART NUMBER 627-9588 1/2



PART NUMBER	FRAME
627-9588	1/2

B

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED



-001

REV B CHNG 1325 TO 1370MHZ 3-27-74
REV A FD CHNG 1-25-74

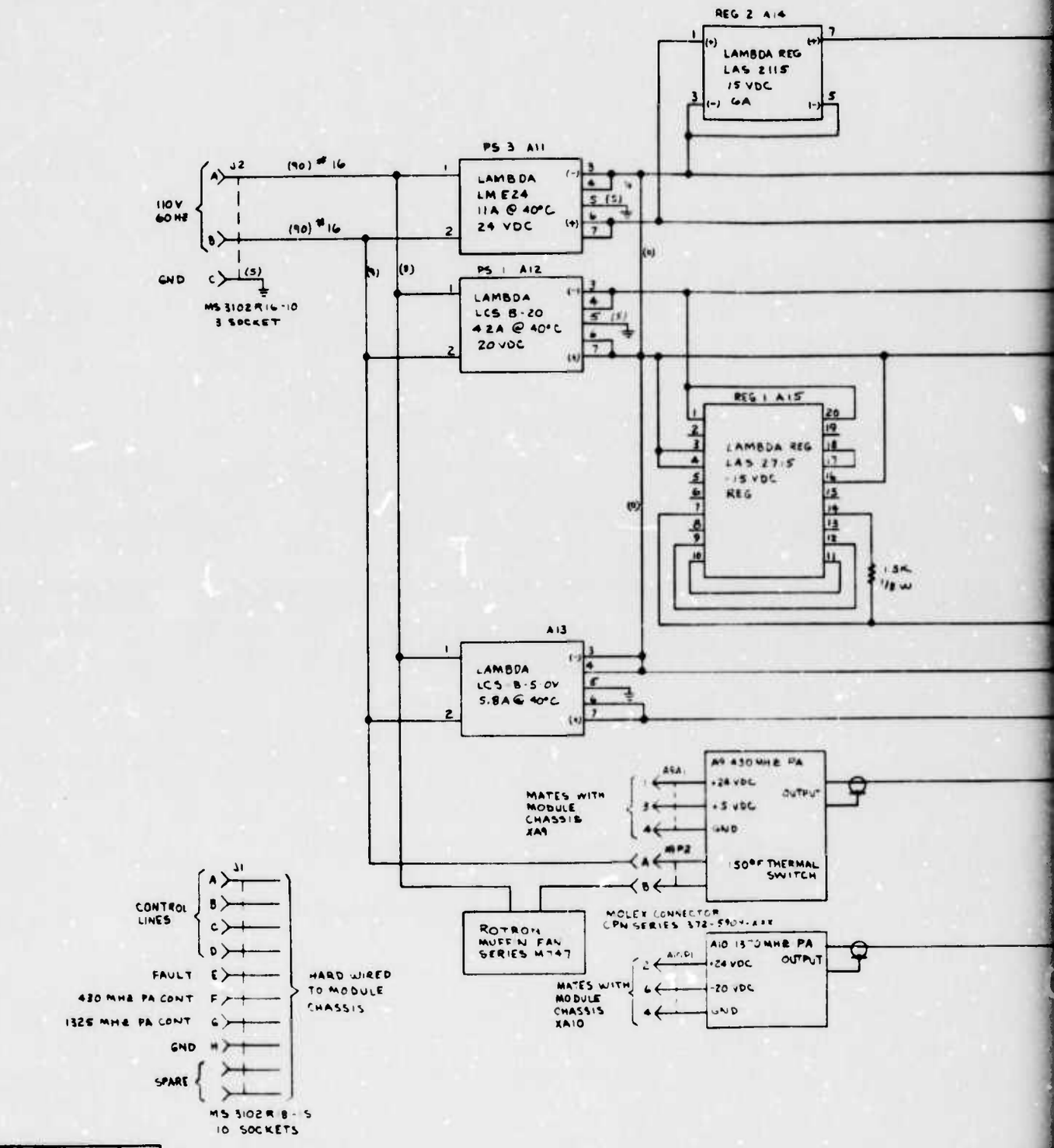
CONTRACT NO.	COLLINS RADIO COMPANY DALLAS, TEX. NEWPORT BEACH, CALIF. CEDAR RAPIDS, IA.	
PREP [illegible]	BLOCK DIAGRAM XMTR PACKET RADIO TEST SET	
CHK		
APVD	SIZE D CODE IDENT 13499	DWG NO. 627-9588
	SCALE NONE	SHEET

B

4A-97/4A-98

NOTES:

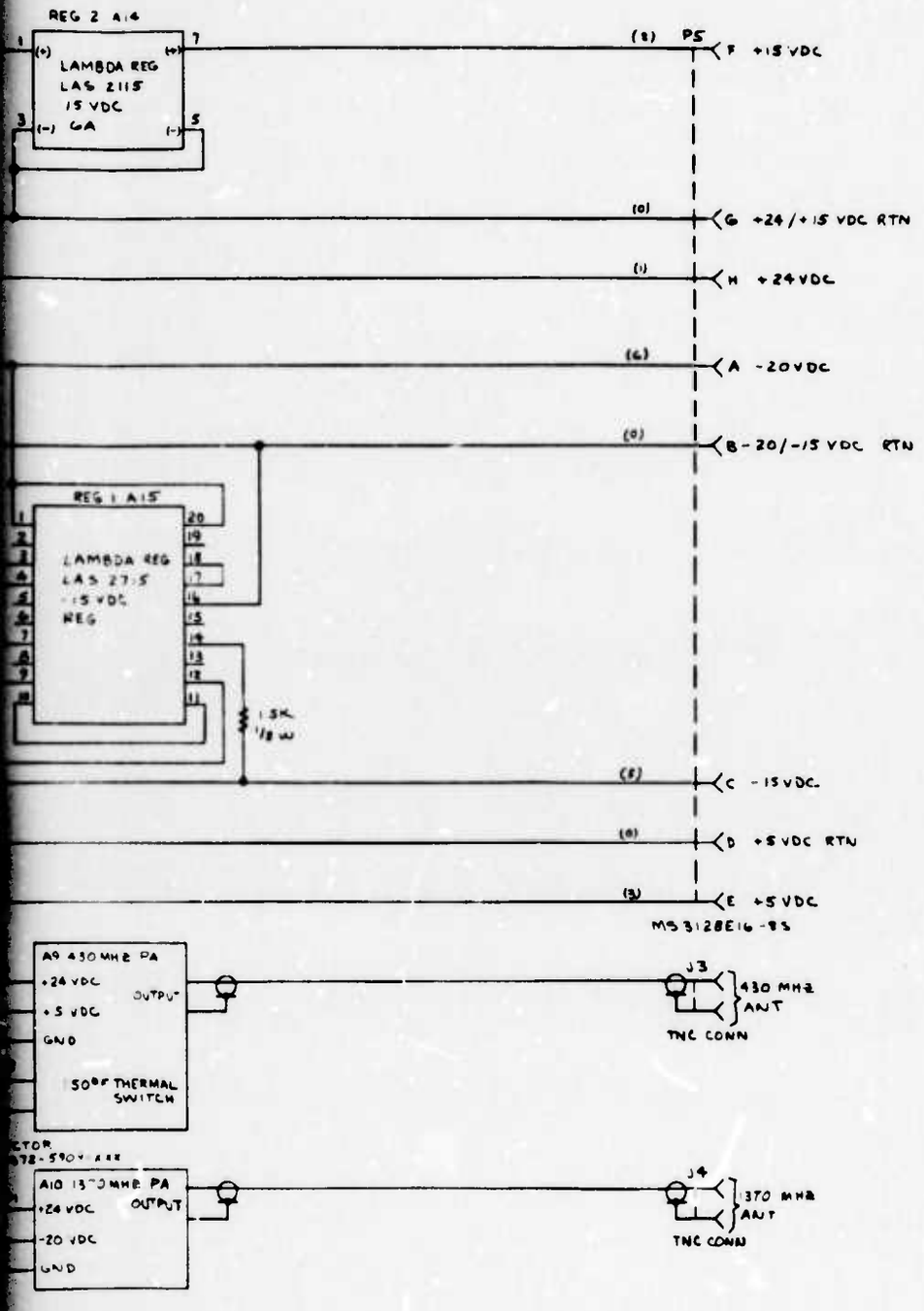
1. ALL WIRE #22 TEFLON UNLESS OTHERWISE NOTED. COLOR CODE IN ( )
2. A9P1 AND A9OP1 ARE CINCH 9 PIN CONNECTORS
3. MS 3102R SERIES CONNECTORS MATES WITH MS 3106 SERIES PLUGS.



PART NUMBER	FRAME
627-9583	14

A

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED



-001

REV A CANG 1325 TO 1370MHZ 3-27-73

PUBLICATIONS DRAWING
REVISIONS TO BE APPROVED AND MADE BY PUBLICATIONS ILLUSTRATING DEPARTMENT

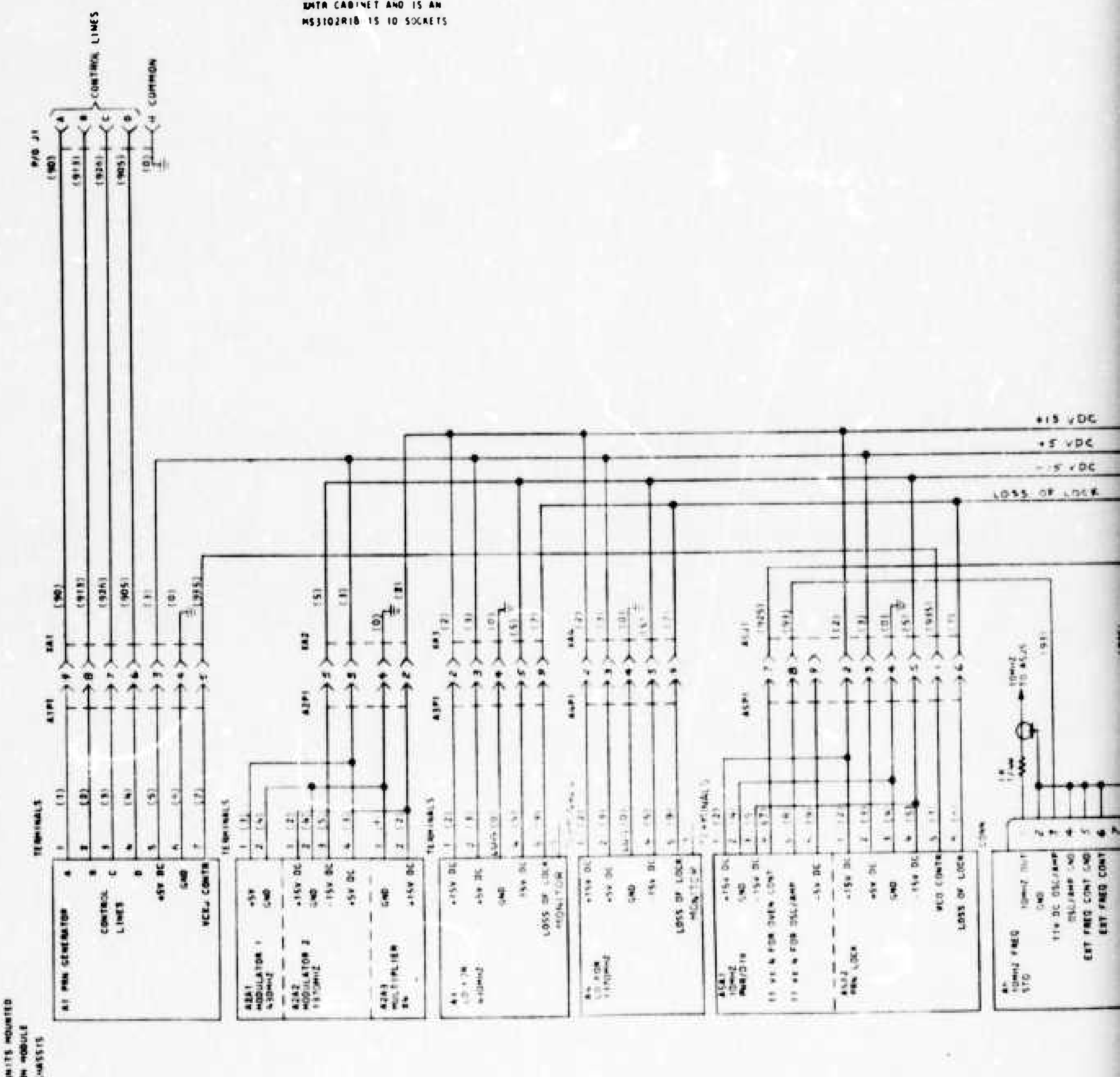
CONTRACT NO	COLLINS RADIO COMPANY — DALLAS, TEX. NEWPORT BEACH CALIF. CEDAR RAPIDS, IA.
PREP [illegible] 11-27-73	WIRING DIAGRAM ENCLOSURE PACKET RADIO TEST (MTR)
CHK	
APVD	SIZE D — CODE IDENT 13499 — DWG NO 627-0539
	SCALE NONE — SHEET [illegible]

3020

B

NOTES

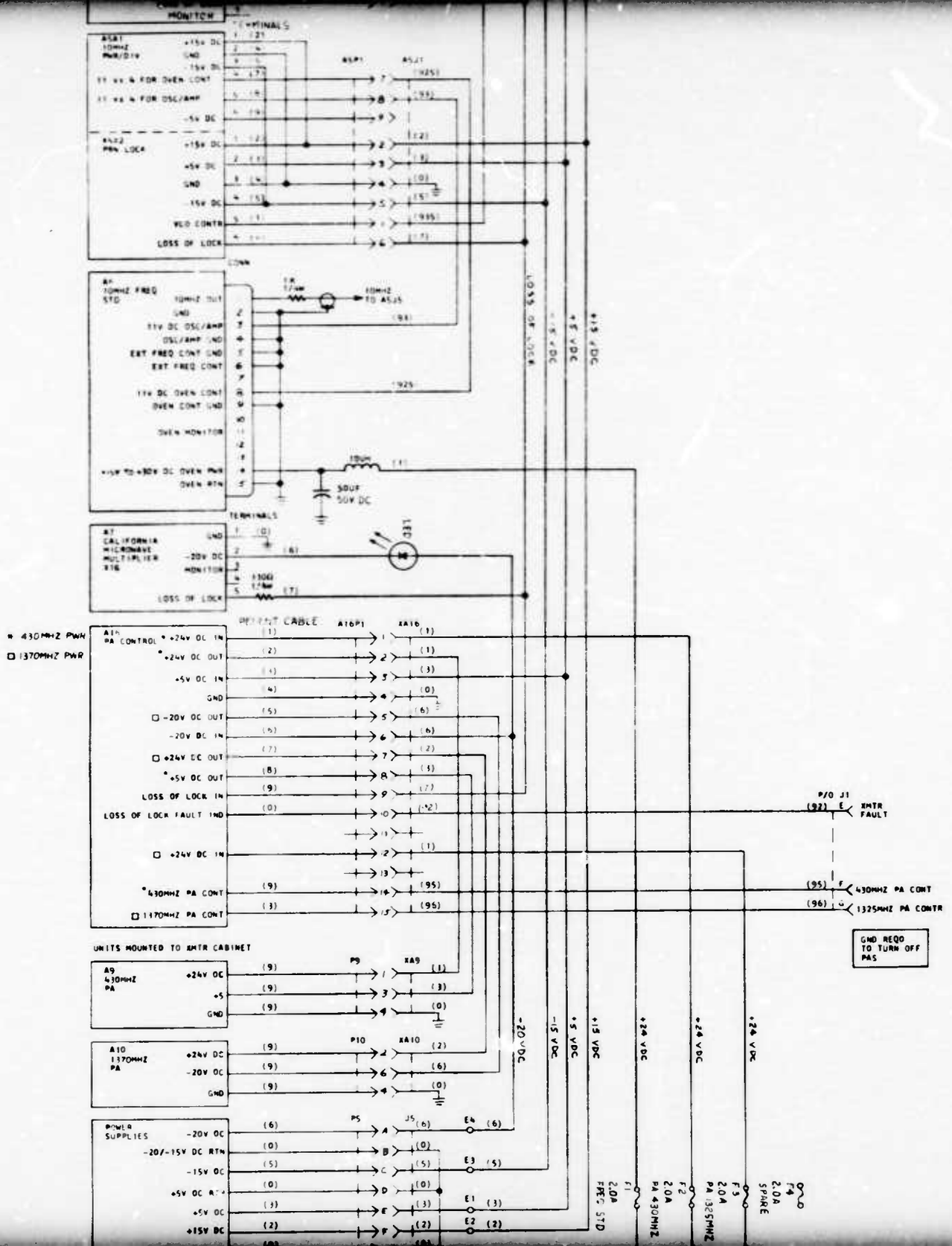
1. UNLESS OTHERWISE NOTED ALL CHASSIS WIRE NO 22 TEFLON WITH COLOR CODE NOTED IN ( )
2. CONNECTOR J1 MOUNTS TO XMTR CABINET AND IS AN MS3102R18 1S 10 SOCKETS

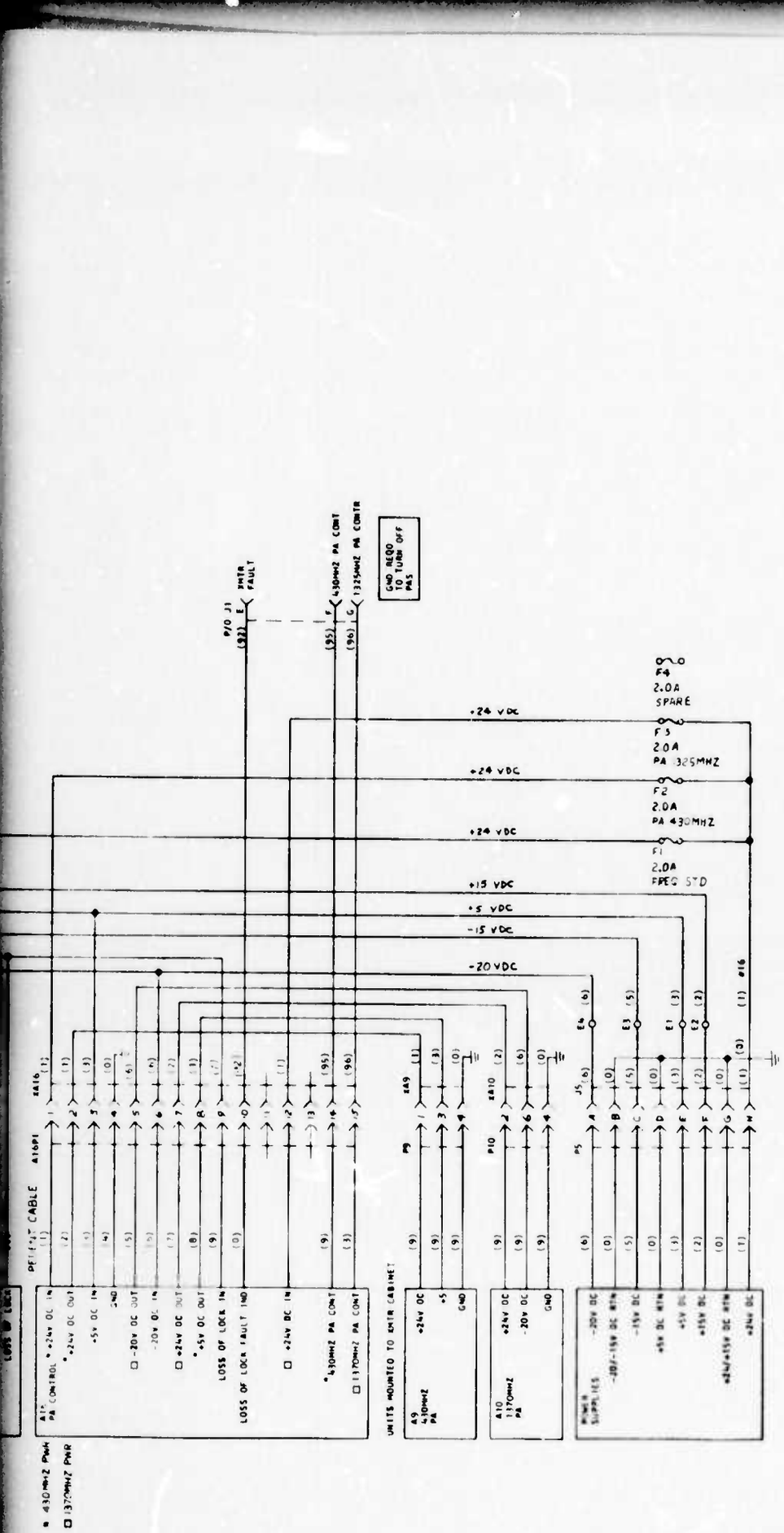


PART NUMBER	FRAME
627-9598	4 4

PART NUMBER	FRAME
627-9598	1/4

A

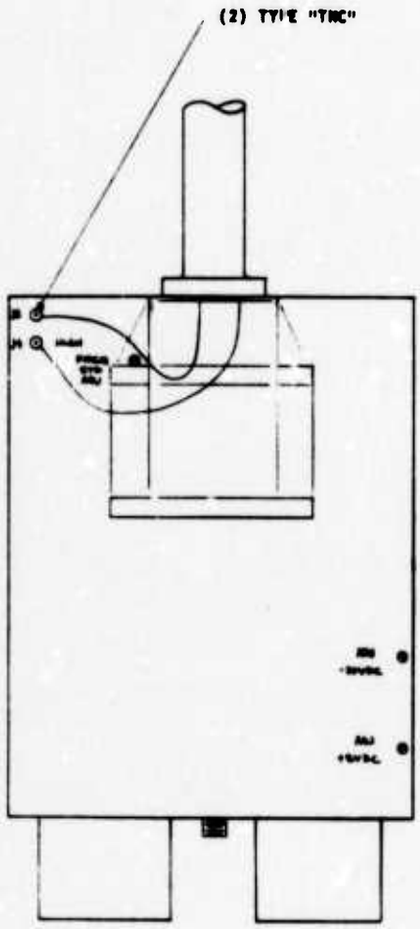

PART NUMBER
FRAME
MONITOR
TERMINALS
A5A1
10MHZ PWR/DIV
+15V DC
GND
-15V DC
11 VDC & FOR OVEN CONT
11 VDC & FOR OSC/AMP
-5V DC
A5A2
PRN LOCK
+15V DC
+5V DC
GND
-15V DC
VCO CONTR
LOSS OF LOCK
A5P1
A5J1
CONN
A5
10MHZ FREQ STD
10MHZ OUT
GND
11V DC OSC/AMP
OSC/AMP GND
EXT FREQ CONT GND
EXT FREQ CONT
11V DC OVEN CONT
OVEN CONT GND
OVEN MONITOR
+15V TO +30V DC OVEN PWR
OVEN RTN
1K 1/2W
10MHZ TO A5J5
(98)
(925)
10UH
50UF 50V DC
A7
CALIFORNIA MICROWAVE MULTIPLIER X16
-20V DC
MONITOR
LOSS OF LOCK
1000 1/4W
LED
(7)
REMOTE CABLE
A16P1
XA16
A11
PA CONTROL
* 430MHZ PWR
□ 1370MHZ PWR
* +24V DC IN
* +24V DC OUT
+5V DC IN
GND
□ -20V DC OUT
-20V DC IN
□ +24V DC OUT
* +5V DC OUT
LOSS OF LOCK IN
LOSS OF LOCK FAULT IND
□ +24V DC IN
*430MHZ PA CONT
□ 1370MHZ PA CONT
P/O J1
XMTR FAULT
430MHZ PA CONT
1325MHZ PA CONTR
GND REQD TO TURN OFF PAS
UNITS MOUNTED TO XMTR CABINET
A9
430MHZ PA
+24V DC
+5
GND
P9
XA9
A10
1370MHZ PA
+24V DC
-20V DC
GND
P10
XA10
POWER SUPPLIES
-20V DC
-20/-15V DC RTN
-15V DC
+5V DC RTN
+5V DC
+15V DC
P5
J5
E4
E3
E1
E2
-20 VDC
-15 VDC
+5 VDC
+15 VDC
+24 VDC
+24 VDC
+24 VDC
F1 2.0A FREQ STD
F2 2.0A PA 430MHZ
F3 2.0A PA 1325MHZ
F4 2.0A SPARE

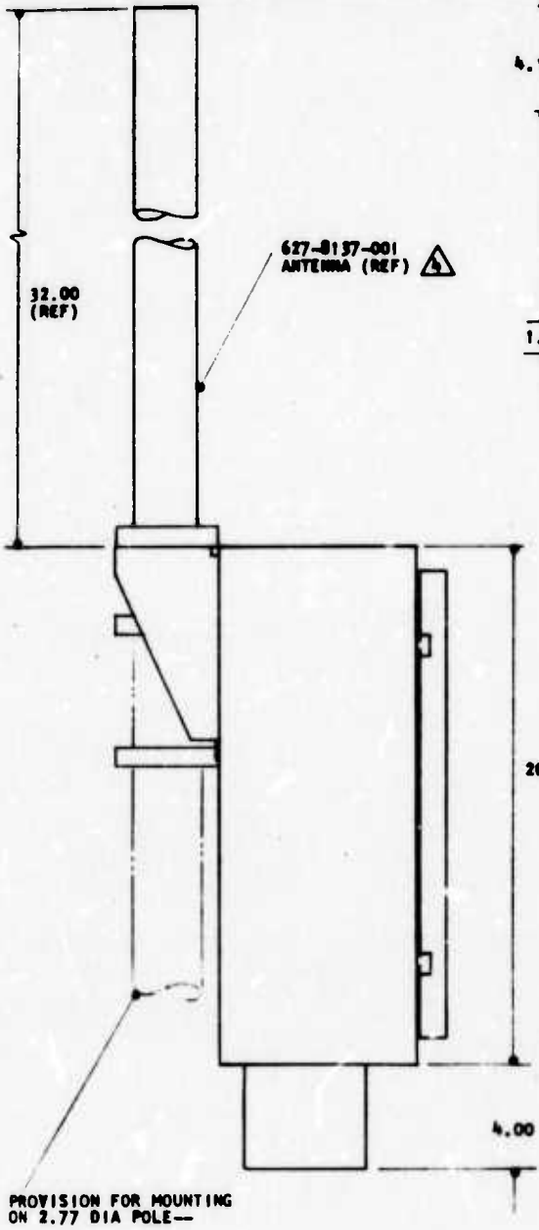

REVISIONS
LTR
DESCRIPTION
DATE
APPROVED
GND RECD TO TURN OFF PAS
P/O J1
(92) E
PWTR FAULT
(95) F
430MHZ PA CONT
(96) G
1325MHZ PA CONTR
F4
2.0A
SPARE
F3
2.0A
PA 325MHZ
F2
2.0A
PA 430MHZ
F1
2.0A
FREQ STD
+24 VDC
+24 VDC
+24 VDC
+15 VDC
+5 VDC
-15 VDC
-20 VDC
PERFECT CABLE
A16P1
A16
A11
PA CONTROL
+24V DC IN
+24V DC OUT
+5V DC IN
GND
-20V DC OUT
-20V DC IN
+24V DC OUT
+5V DC OUT
LOSS OF LOCK IN
LOSS OF LOCK FAULT IND
+24V DC IN
430MHZ PA CONT
1370MHZ PA CONT
UNITS MOUNTED TO ENTR CABINET
A9
430MHZ
PA
P9
+24V DC
+5
GND
A10
1370MHZ
PA
P10
+24V DC
-20V DC
GND
POWER SUPPLIES
P5
J5
-20V DC
-15V DC RTN
-15V DC
+5V DC RTN
+5V DC
+15V DC
+24V+15V DC RTN
+24V DC
E4
E3
E1
E2
#16
LOSS OF LOCK
430MHZ PWR
1370MHZ PWR
PUBLICATIONS DRAWING
REVISIONS TO BE ASSEMBLED AND MADE BY PUBLICATIONS ILLUSTRATING DEPARTMENT
REV A CHG 1325 TO 1370MHZ 3-27-74
CONTRACT NO
PREP E.W. Klingbeil
CHK
APVD
COLLINS RADIO COMPANY
DALLAS TEX NEWPORT BEACH CALIF CEDAR RAPIDS IA
WIRING DIAGRAM
MODULE CHASSIS
PA/EXCITER TEST PANEL
SIZE D
CODE IDENT 13499
DWG NO 9553
SCALE NONE
SHEET 1 OF 1

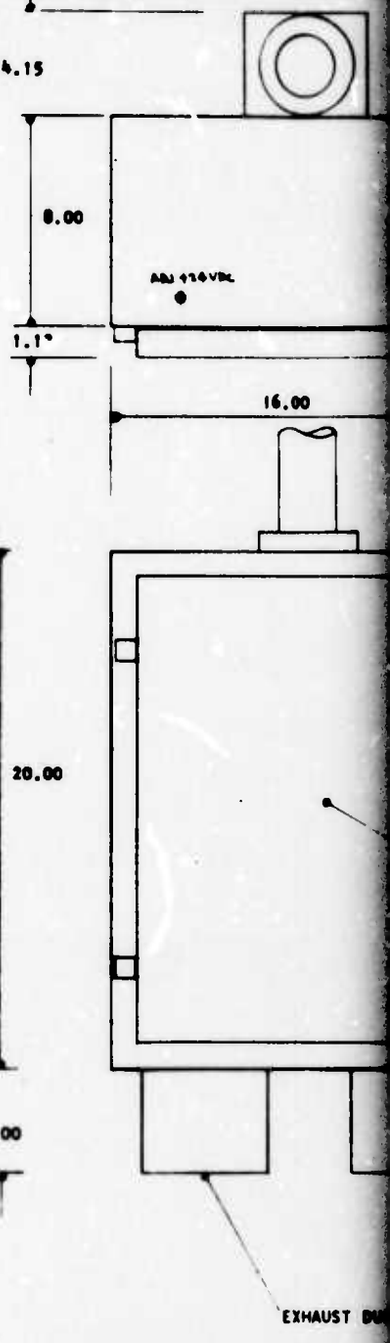
4A-101/4A-102

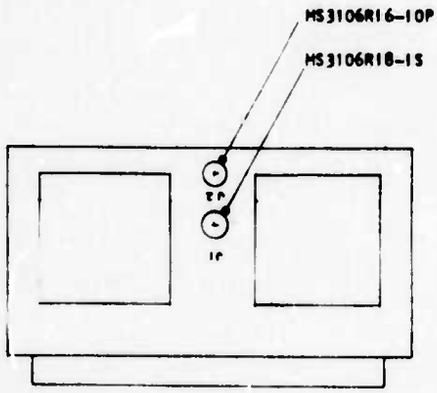
NOTES:

1. WEIGHT OF UNIT IS 90 POUNDS.
2. POWER REQUIRED IS 110VAC WATTS.
3. PART NUMBER OF THIS UNIT IS 627-9561-001.
4. ASSY ANTENNA TO MTG BRACRET WITH (6) 1/4-20UNC X 1 1/4 L BOLTS, NUT & WASHERS.







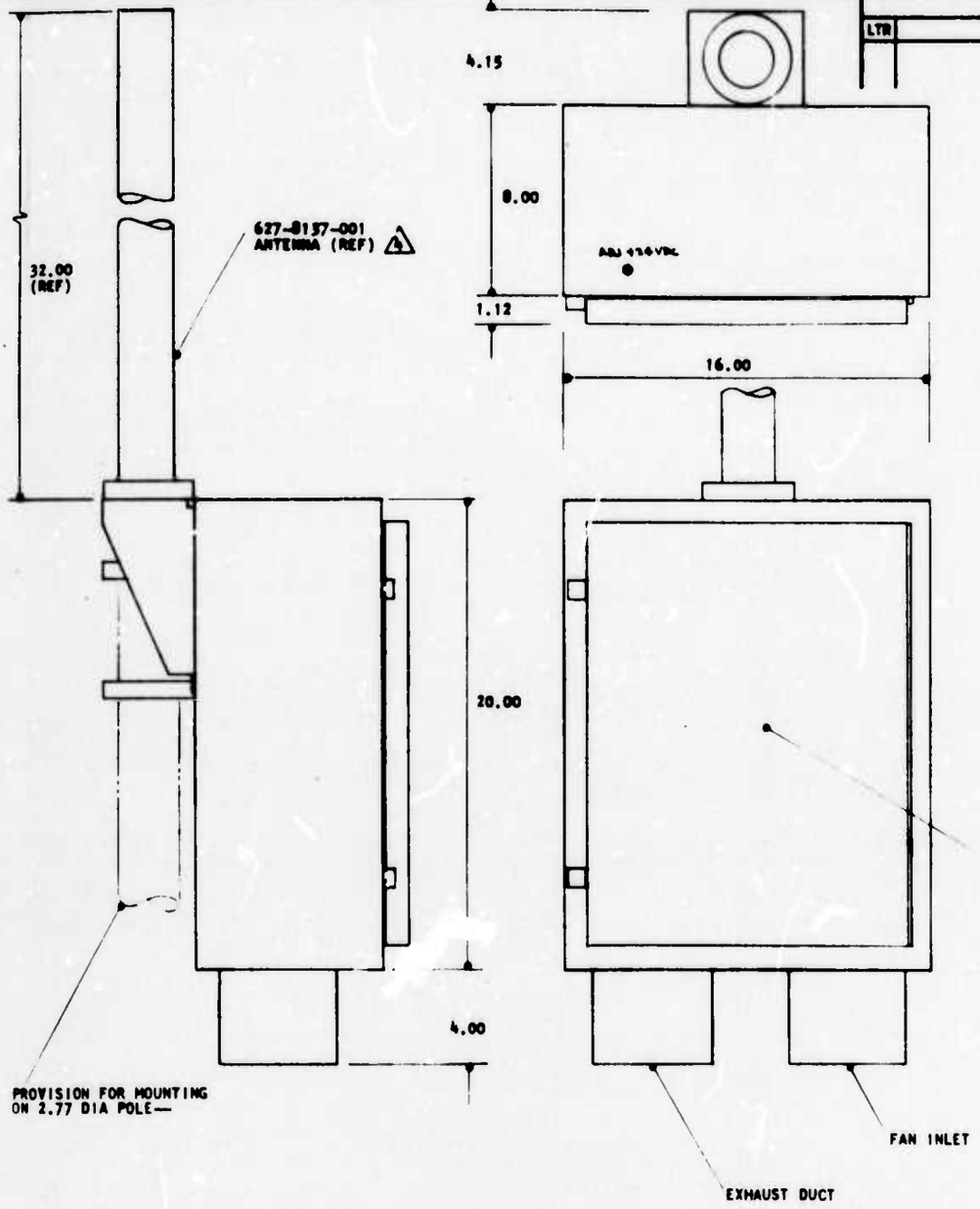


QTY	ITEM NO.	PART OR IDENTIFYING NO.
	DASH NO.	

MATERIAL: N/A	UNLESS OTHERWISE SPECIFIED	CONTRACT NO.
	DIMENSIONS ARE IN INCHES; TOL ON DEC DIM.: .XX = ±.02, .XXX = ±.008	PREP D. DELP
	HOLE DIAMETERS: UNDER .251 DIA = +.005-.005; .251 TO .500 DIA = +.006-.005; OVER .500 DIA = +.008-.005	CHK
FINISH: N/A	ANGLES: ±1.0°	APVD A A Hc
	ECCENTRICITY BETWEEN DIA ON AN AXIS NOT TO EXCEED .010 DIA	
	PART SHALL COMPLY TO 580-5400-001	

NEXT ASSY: TYPE NO:

A



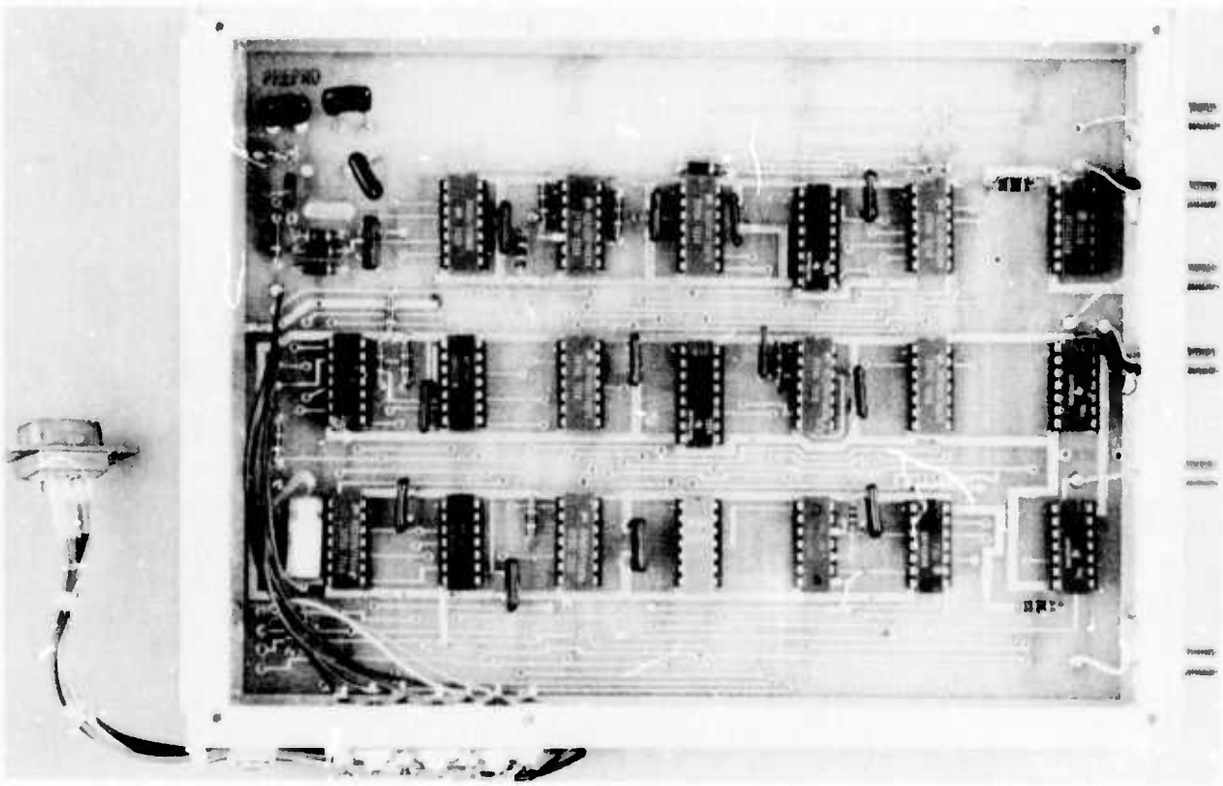
REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED

QTY	ITEM NO.	PART OR IDENTIFYING NO	NAME	DESCRIPTION	UM	MN	ALTN PREF
	DASH NO.		PARTS LIST				

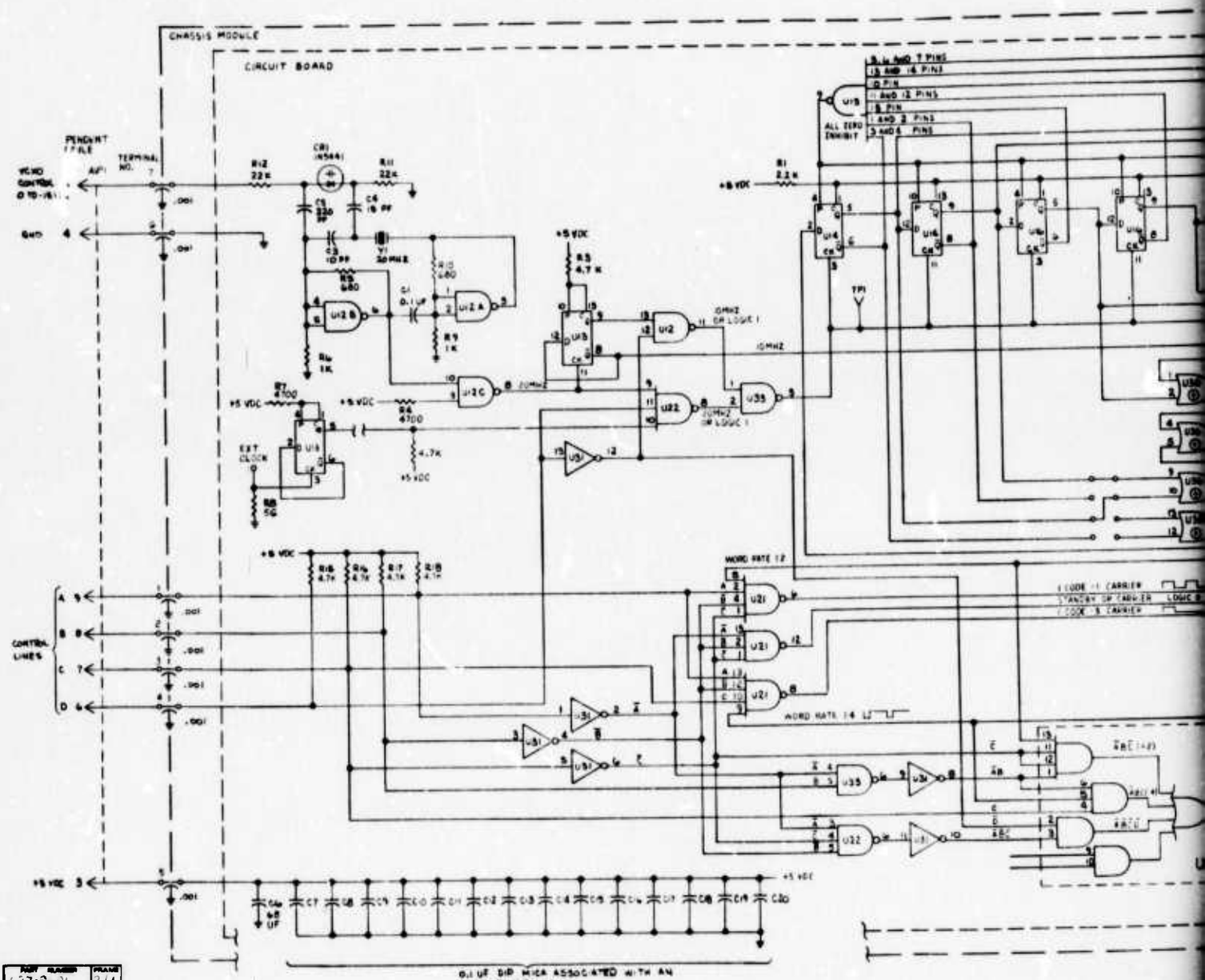
MATERIAL: N/A	UNLESS OTHERWISE SPECIFIED	CONTRACT NO.	COLLINS RADIO COMPANY
FINISH: N/A	DIMENSIONS ARE IN INCHES; TOL ON DEC DIM.: .XX = ±.02, .XXX = ±.008 HOLE DIAMETERS: UNDER .251 DIA = +.005-.005 .251 TO .500 DIA = +.006-.005 OVER .500 DIA = +.008-.005 ANGLES: ±1.0° ECCENTRICITY BETWEEN DIA ON AN AXIS NOT TO EXCEED .010 DIA PART SHALL COMPLY TO 580-5400-001	PREP D. DELFELD 11/20/73 CHK APVD A A Hanck	DALLAS, TEX NEWPORT BEACH, CALIF CEDAR RAPIDS, IA TRANSMITTER UNIT OUTLINE & INSTALLATION PACKET RADIO TEST SET SIZE C · CODE IDENT 13499 · DWG NO. 627-9578 SCALE 1/4 · SHEET

FRO ☐ NFP ☐ REL ☐ REV__ TC__ CR 0 NB 0 DL 2 TO 0

B

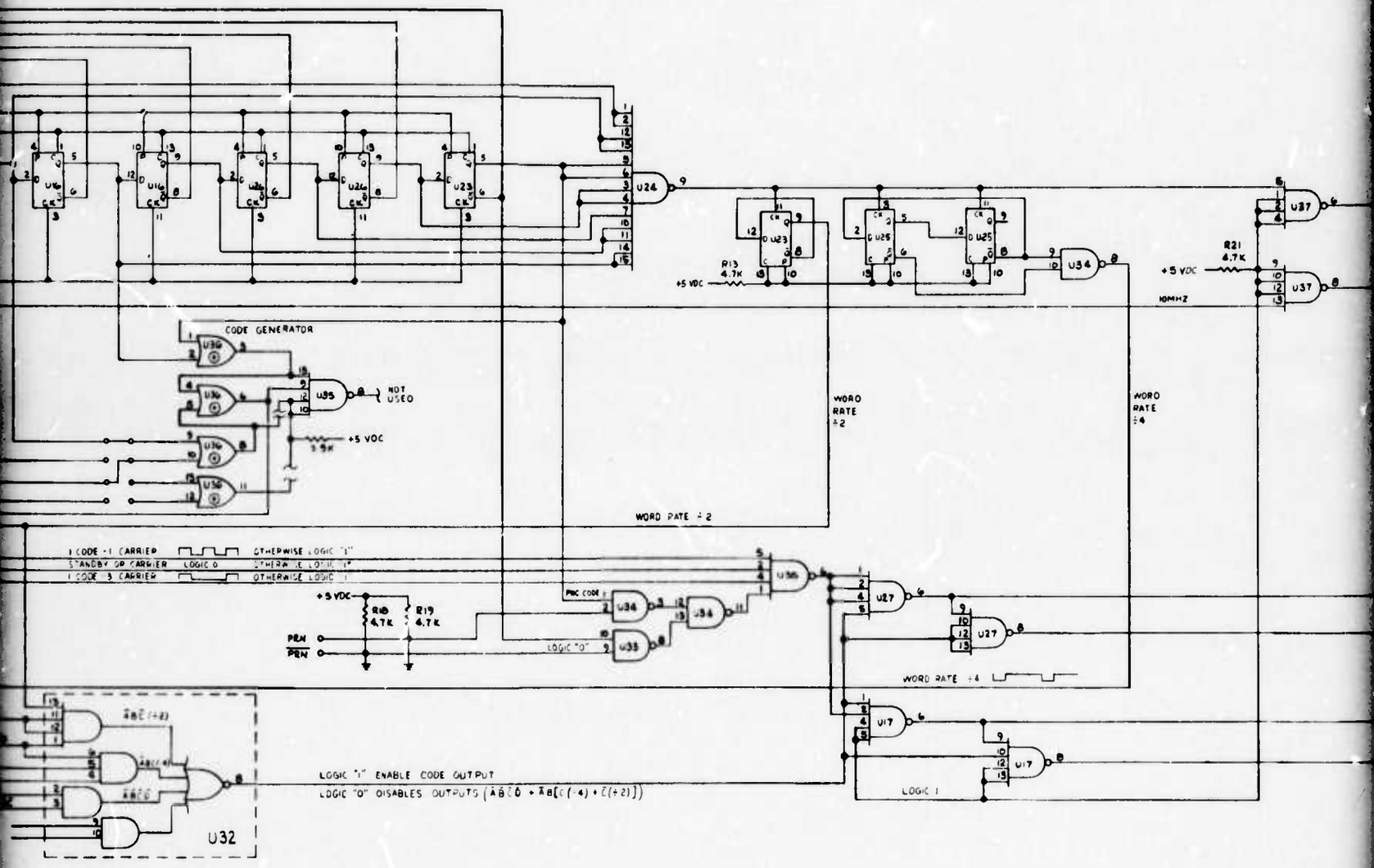


A1 - PRN Code Generator



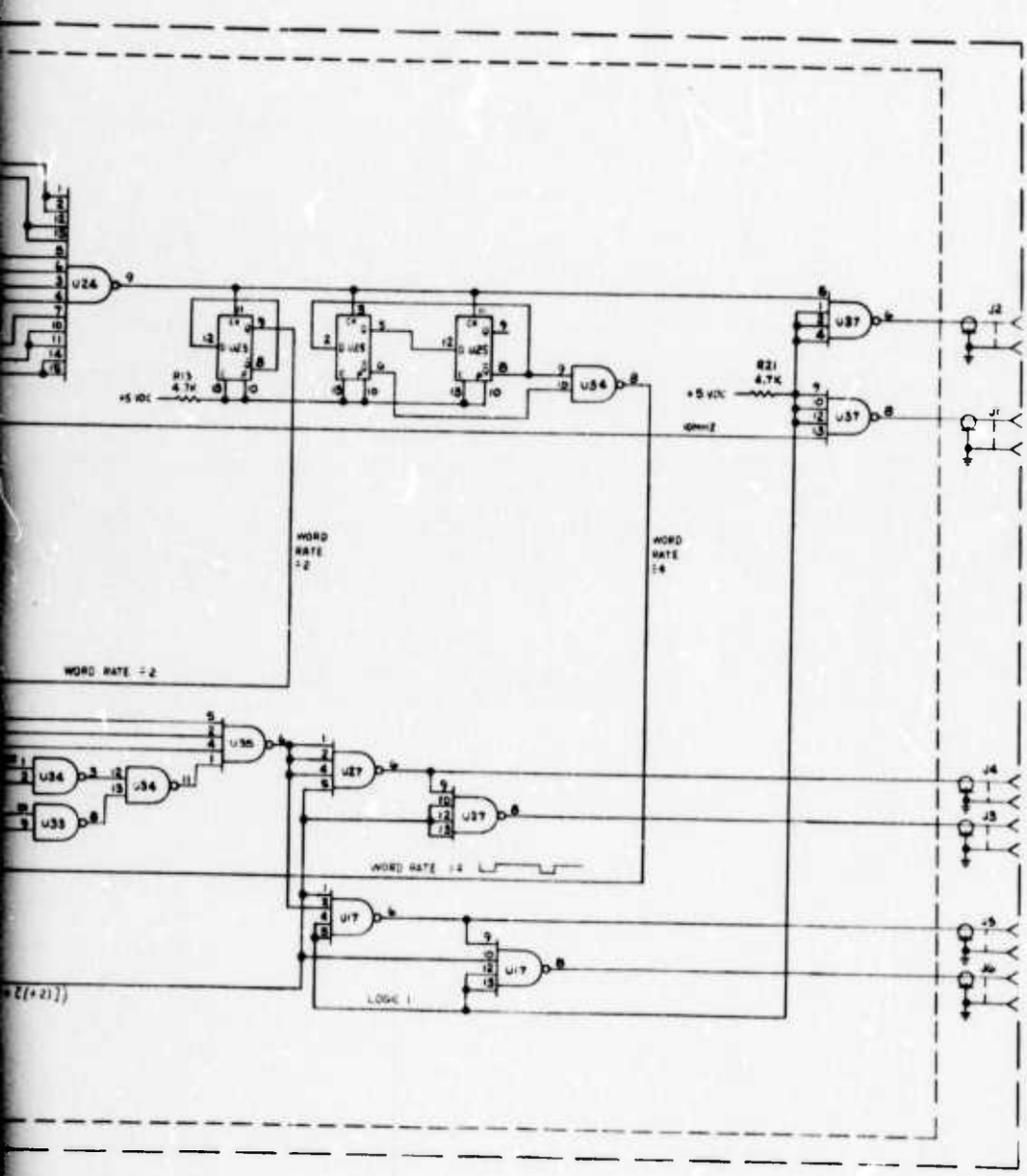
PART NUMBER	FRAME
627-3601	2/4

A



PART NUMBER	FRAME
627-9601	1/4

11 B



OUTPUTS

1. DATA AND DATA BOTH LOGIC 1 WHEN CODE AND CARRIER DISABLED
2. FOR CARRIER
   DATA LOGIC 0
   DATA LOGIC 1

REVISIONS			
LTR	DESCRIPTION	DATE	APPRD.

-001

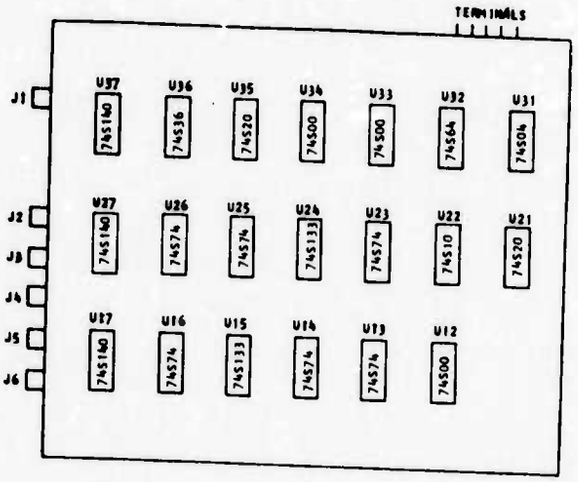
REV A FO CHNG 1-25-74

CONTRACT NO	COLLINS RADIO COMPANY DALLAS, TEX. NEWPORT BEACH, CALIF. CEDAR RAPIDS, IA
DRFD J. MUDLEY 11-21-73	SCHEMATIC DIAGRAM AI PRN GENERATOR PACKET RADIO TEST SETS
CHK	
APVD	
	SIZE D CODE IDENT NO. 13499 DWG NO. 627-9601
	SCALE FULL SHEET 1 OF 2

C

NOTES:

P. IC LOCATION C



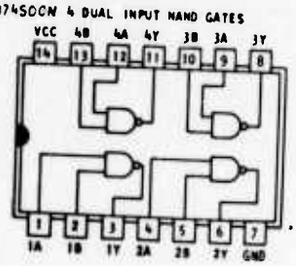
2. CONTROL LINE TRUTH TABLE

CONTROL LINES				OPERATION DESCRIPTION
A	B	C	D	
0	0	0	0	STANDBY
0	0	0	1	CW
0	0	1	0	CONT CODE AT 10 MCPS
0	0	1	1	CONT CODE AT 20 MCPS
0	1	0	0	1 CODE - 1 CARRIER OFF AT 10 MCPS
0	1	0	1	1 CODE - 1 CARRIER OFF AT 20 MCPS
0	1	1	0	1 CODE - 3 CARRIER OFF AT 10 MCPS
0	1	1	1	1 CODE - 3 CARRIER OFF AT 20 MCPS
1	0	0	0	1 CODE - 1 CARRIER AT 10 MCPS
1	0	0	1	1 CODE - 1 CARRIER AT 20 MCPS
1	0	1	0	1 CODE - 3 CARRIER AT 10 MCPS
1	0	1	1	1 CODE - 3 CARRIER AT 20 MCPS

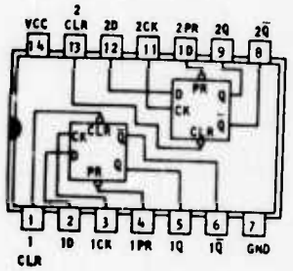
1 IS OPEN CKT (BECOMES TTL LOGIC "1")
0 IS GND (TTL LOGIC "0")

3. IC TYPE S (VCC +5V DC) TOP VIEWS

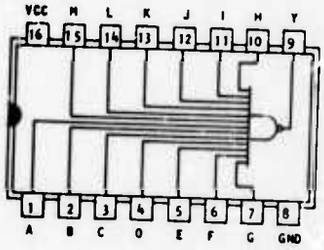
A. U12/U33/U34 TI SN74S00N 4 DUAL INPUT NAND GATES



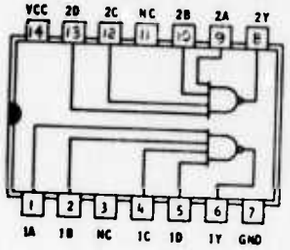
B. U13/U14/U16/U23/U25/U26 TI SN 74S74N DUAL "D" TYPE POSITIVE EDGE TRIGGERED FLIP FLOPS.



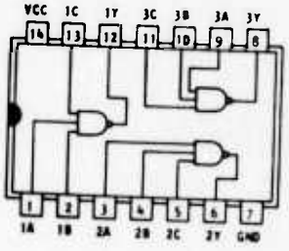
C. U15/U24 TI SN74S133N 13 INPUT NAND GATE



D. U21/U35 TI SN74S20N DUAL 4 INPUT NAND GATES



E. U22 TI SN74S10N 3 INPUT NAND GATES

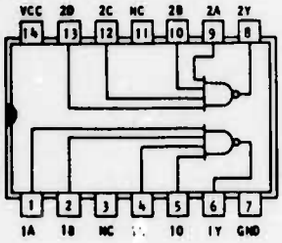


PART NUMBER	FRAME
627-9601	3/4

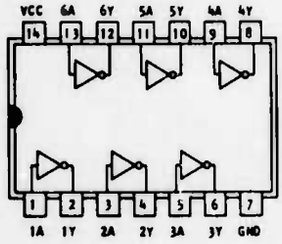
A

REVISIONS	
LTR	DESCRIPTION

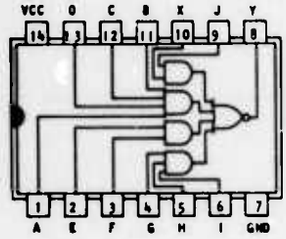
F. U37/U27/U37 TI SN74S140N QUAL 4 INPUT NAND 50 OHM LINE DRIVER.



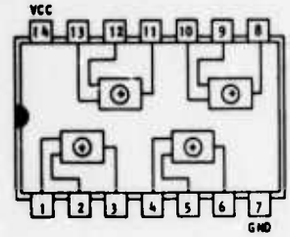
G. U31 TISN74S04 HEX INVERTERS



H. U32 TISN74S64N 4-2-3-2 INPUT AND OR INVERT GATES

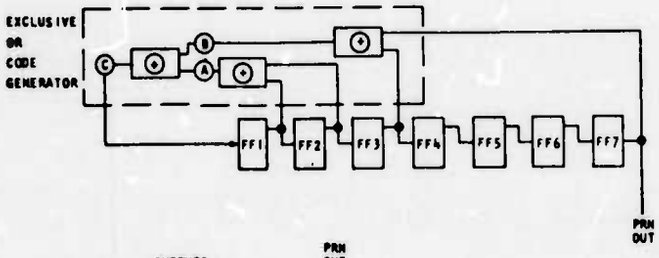


I. U36 NATIONAL SEMICONDUCTOR DM 74S86N 4 QUAL INPUT EXCLUSIVE OR GATES



4. DATA OUTPUT WORD (127 CHIPS)

1 1 1 1 1 1 1 0 1 1 1 0 1 1 0 1 1 1 1 1 0
1 0 0 0 1 0 1 1 0 0 1 0 1 1 1 1 1 1 0 0 0
1 0 0 0 0 0 0 1 1 0 0 1 1 0 1 1 0 0 0 1
1 1 0 0 1 1 1 0 1 0 1 1 1 0 0 0 0 1 0 0
1 1 0 0 0 0 0 1 0 1 0 1 0 1 1 0 1 0 0 1
0 0 1 0 1 0 0 1 1 1 1 1 0 0 1 0 0 0 1 1 0
1 0 1 0 0 0 0



	OUTPUTS							PRN OUT		
CLOCK STEP	FF 1	FF 2	FF 3	FF 4	FF 5	FF 6	FF 7	A	B	C
1	1	1	1	1	1	1	1	0	0	0
2	0	1	1	1	1	1	1	1	0	1
3	1	0	1	1	1	1	1	1	0	1
4	1	1	0	1	1	1	1	0	1	1
5	1	1	1	0	1	1	1	0	0	0
6	0	1	1	1	0	1	1	1	0	1
7	1	0	1	1	1	0	1	1	0	1
8	1	1	0	1	1	1	0	0	0	0
9	0	1	1	0	1	1	1	1	0	1
10	1	0	1	1	0	1	1			

ETC

5. UNLESS OTHERWISE SPECIFIED:
ALL RESISTANCE VALUES ARE IN OHMS
ALL CAPACITANCE VALUES ARE IN MICROFARADS

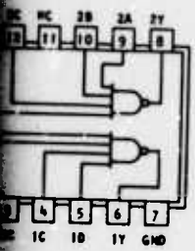
SIZE	CODE IDENT
D M	13499
SCALE NONE	

B

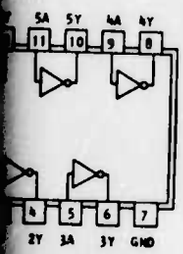
C

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED

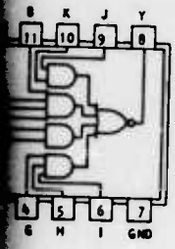
DUAL 4 INPUT NAND 50 OHM



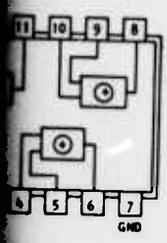
ERS



PUT AND OR INVERT GATES

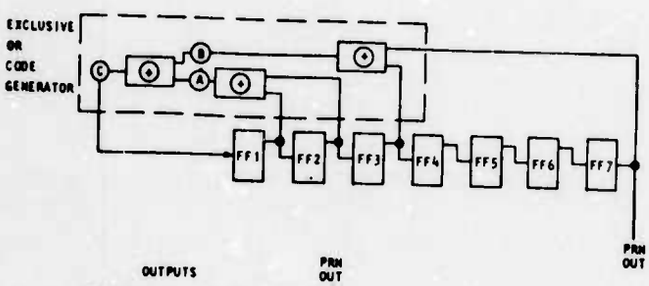


74S86N 4 DUAL INPUT EXCLUSIVE OR GATES



4. DATA OUTPUT WORD (127 CHIPS)

```
1 1 1 1 1 1 1 0 1 1 1 0 1 1 0 1 1 1 1 1 0
1 0 0 0 1 0 1 1 0 0 1 0 1 0 1 1 1 1 1 0 0 0
1 0 0 0 0 0 0 1 1 0 0 1 1 0 1 1 0 0 0 0 1
1 1 0 0 1 1 1 0 1 0 1 1 1 0 0 0 0 1 0 0
1 1 0 0 0 0 0 1 0 1 0 1 0 1 1 0 1 0 0 1
0 0 1 0 1 0 0 1 1 1 1 1 0 0 1 0 0 0 1 1 0
1 0 1 0 0 0 0
```



CLOCK STEP	OUTPUTS FF 1	FF 2	FF 3	FF 4	FF 5	FF 6	FF 7	PRN OUT A	B	C
1	1	1	1	1	1	1	1	0	0	0
2	0	1	1	1	1	1	1	1	0	1
3	1	0	1	1	1	1	1	1	0	1
4	1	1	0	1	1	1	1	0	1	1
5	1	1	1	0	1	1	1	0	0	0
6	0	1	1	1	0	1	1	1	0	1
7	1	0	1	1	1	0	1	1	0	1
8	1	1	0	1	1	1	0	0	0	0
9	0	1	1	0	1	1	1	1	0	1
10	1	0	1	1	0	1	1			

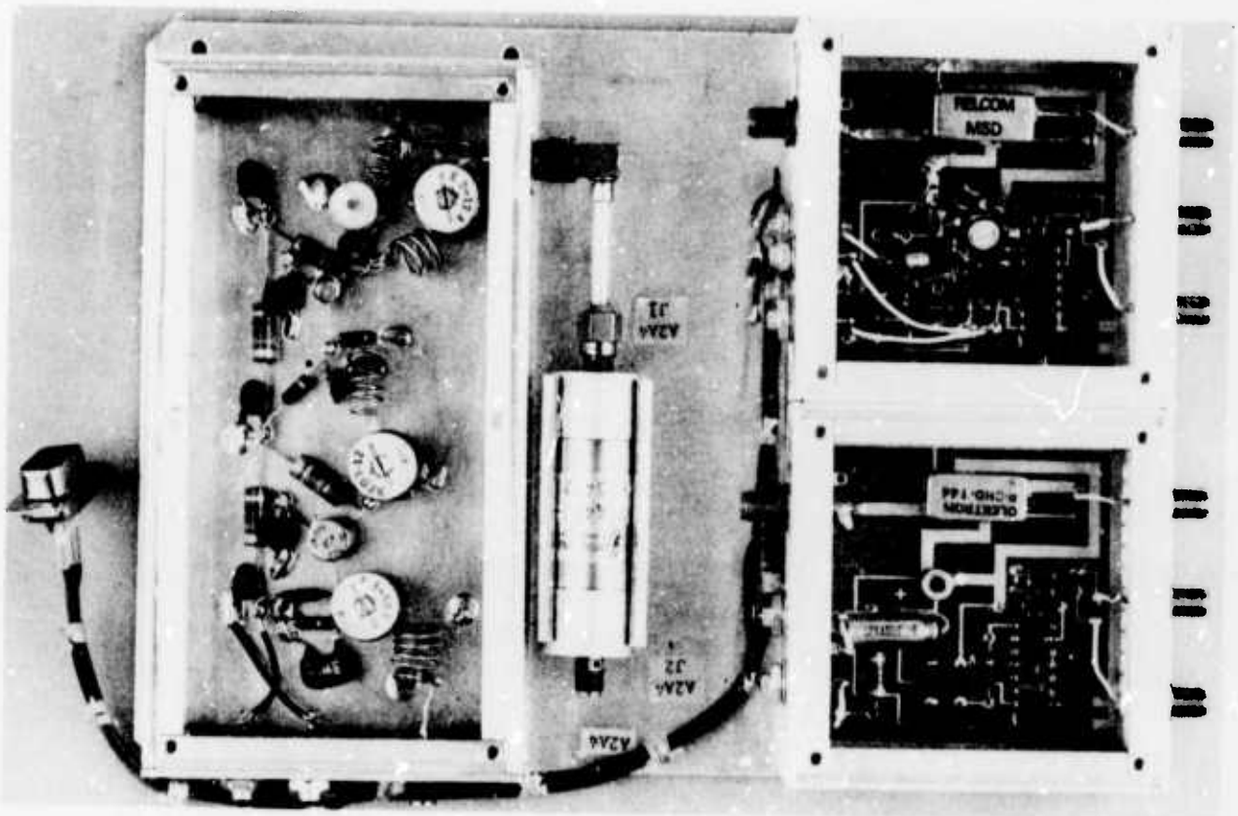
ETC

5. UNLESS OTHERWISE SPECIFIED:
ALL RESISTANCE VALUES ARE IN OHMS
ALL CAPACITANCE VALUES ARE IN MICROFARADS

B

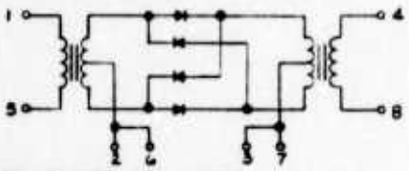
C

SIZE	CODE IDENT	DWG NO.
D_M	13499	627-9601
SCALE NONE		SHEET 2 OF 2


A2A4
J1
A2A4
J2
A2A4
RELCOM
MSD

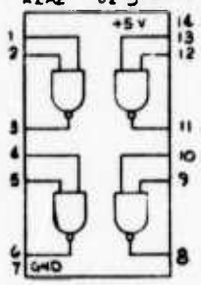
NOTES:

1. A1 IN A2A1 IS OLEKTRON R CMD-146

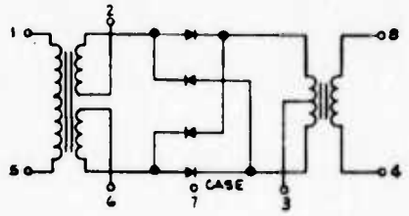


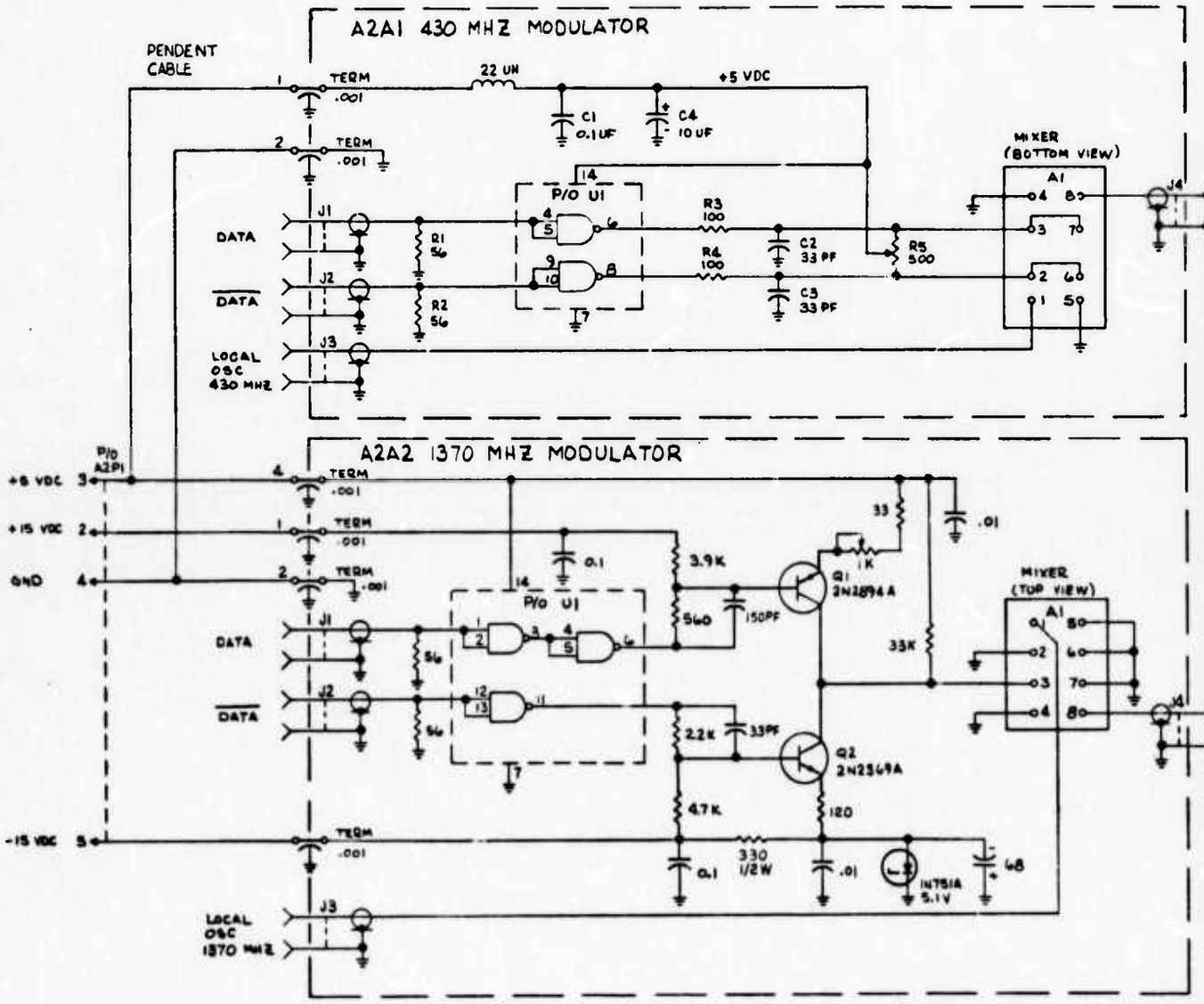
2. ALL RESISTORS 1/4 WATT 10% UNLESS OTHERWISE NOTED.
3. ALL CAPACITORS IS MICROFARADS UNLESS OTHERWISE NOTED.

4. A2A1 U1 } SN74S00
   A2A2 U2 }



5. A2A2 U1 IS A WATKINS JOHNSON M6D MIXER



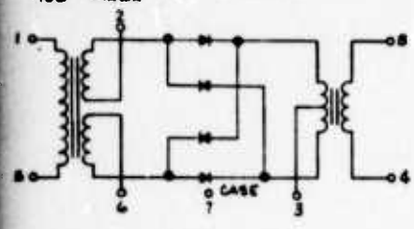


NEXT ASSY:

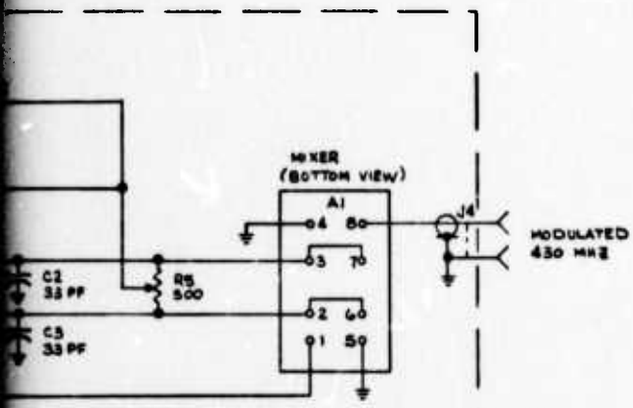
TYPE NO:

A

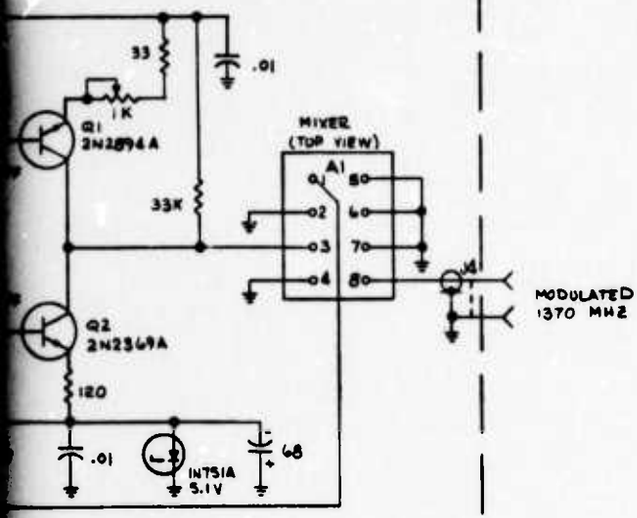
5. A2A2 U1 IS A WATKINS JOHNSON M6D MIXER



REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED



-001



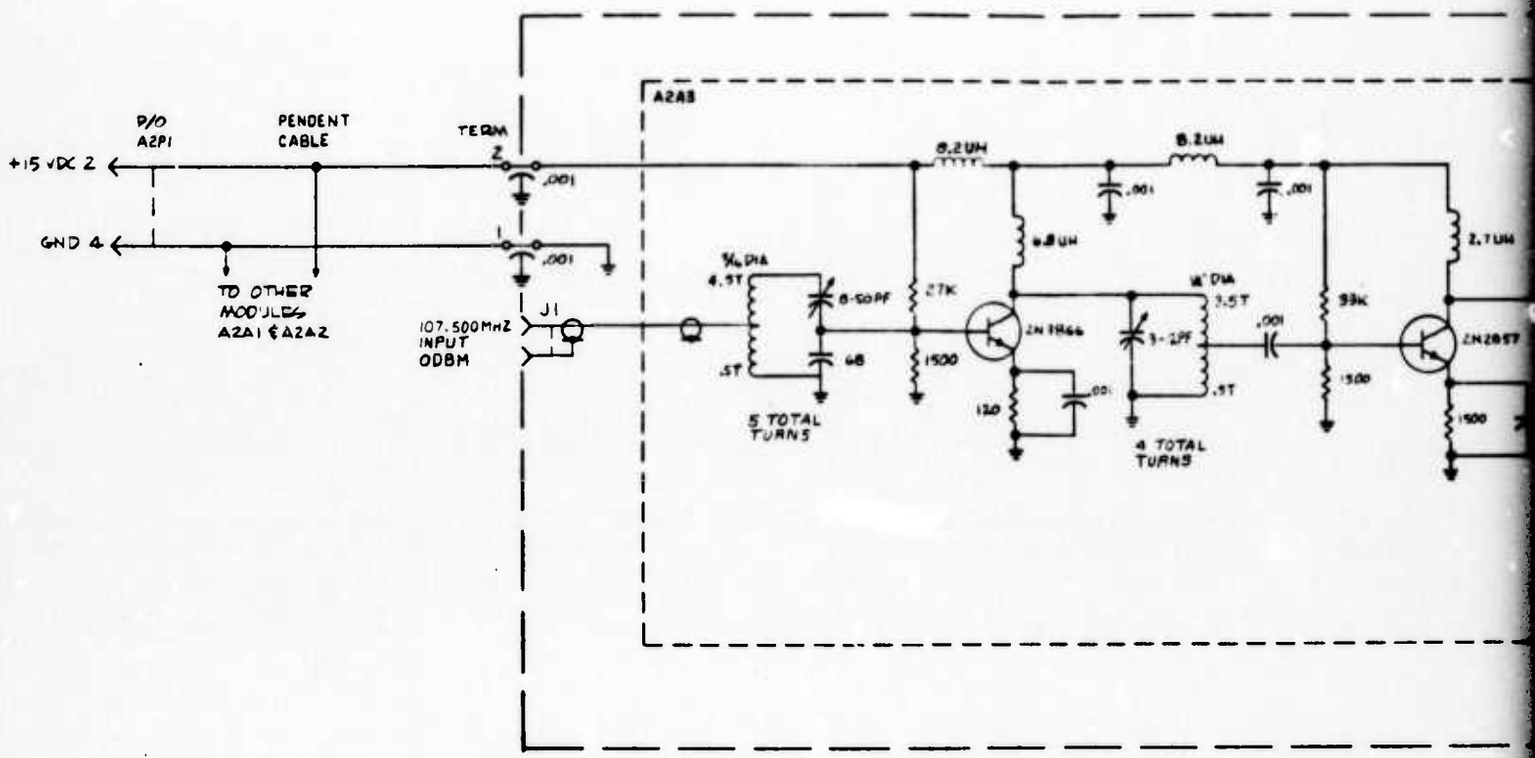
MATERIAL	UNLESS OTHERWISE SPECIFIED	CONTRACT NO	COLLINS RADIO COMPANY
FINISH	DIMENSIONS ARE IN INCHES; TOL ON DEC DIM.: .XX = ±.02, .XXX = ±.008 HOLE DIAMETERS: UNDER .251 DIA = +.005 .005 .251 TO .500 DIA = +.005 .005 OVER .500 DIA = +.008 .005 ANGLES: ±1.0° ECCENTRICITY BETWEEN DIA ON AN AXIS NOT TO EXCEED .010 DIA PART SHALL COMPLY TO MIL-STD-100 001	PREP J. MURLEY 11-3-73 CHK APVD	DALLAS, TEX NEWPORT BEACH, CALIF CEDAR RAPIDS, IA
			SCHEMATIC DIAGRAM PACKET RADIO TEST SET TR A2A1 430 MHZ MODULATOR AND A2A2 1370 MHZ MODULATOR WIRING
			SIZE D CODE IDENT 13499 DWG NO 627-9597
			SCALE NONE SHEET

FRO ☐ NFP ☐ REL ☐ REV ___ TO ___ CR ___ AND ___ DL ___ TO ___

B

NOTES:

1. UNLESS OTHERWISE SPECIFIED,
   ALL CAPACITOR VALUES ARE IN
   MICROFARADS
   ALL RESISTANCE VALUES ARE IN OHMS
2. COILS MADE FROM NO 20 BUSS WIRE

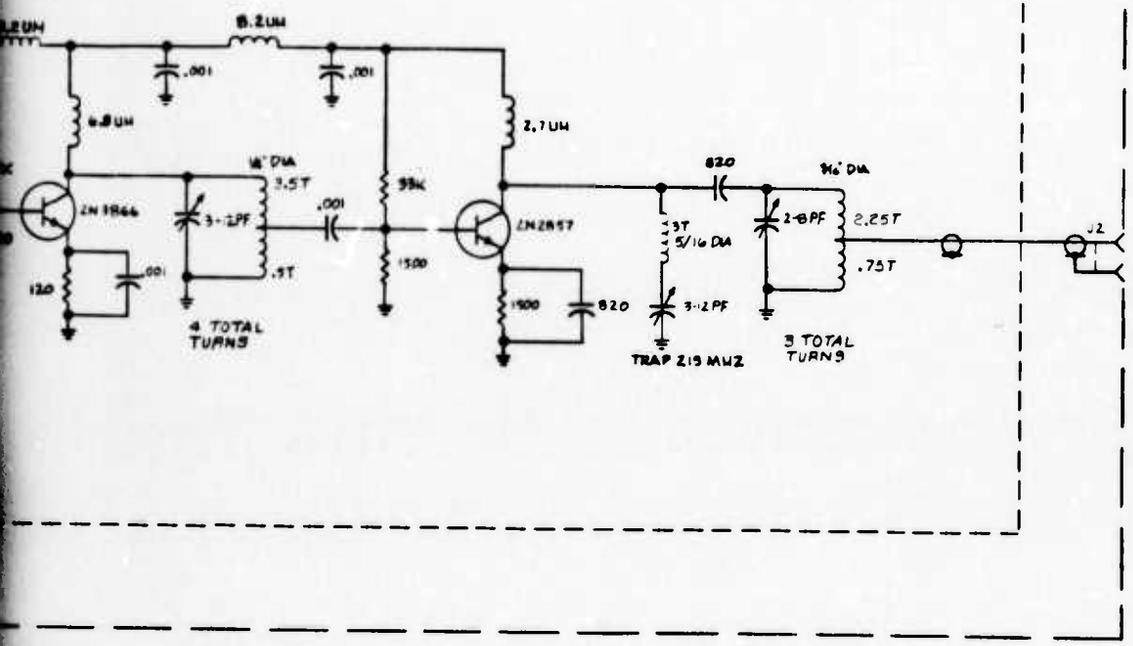


NEXT ASSY

TYPE NO:

A

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED

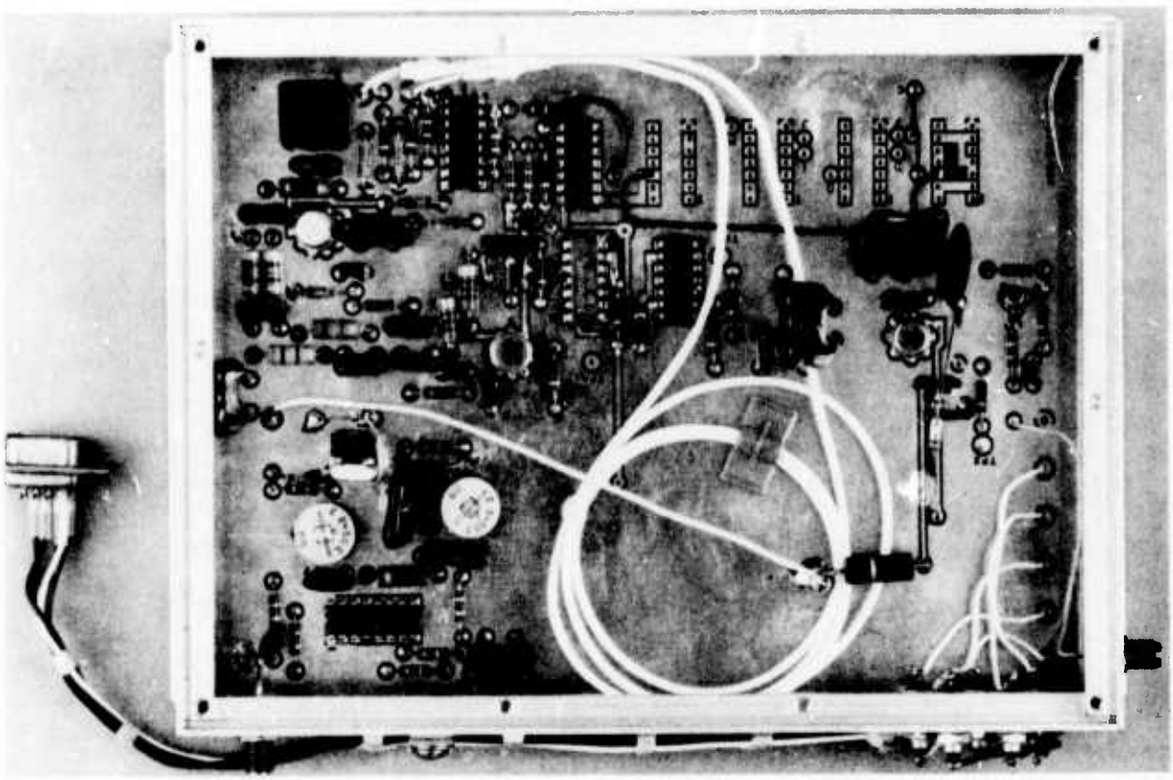


TELONIC
TBA 430-40-266
FILTER
430 MHZ CENTER FREQUENCY
40 MHZ BW
2 POLE FILTER

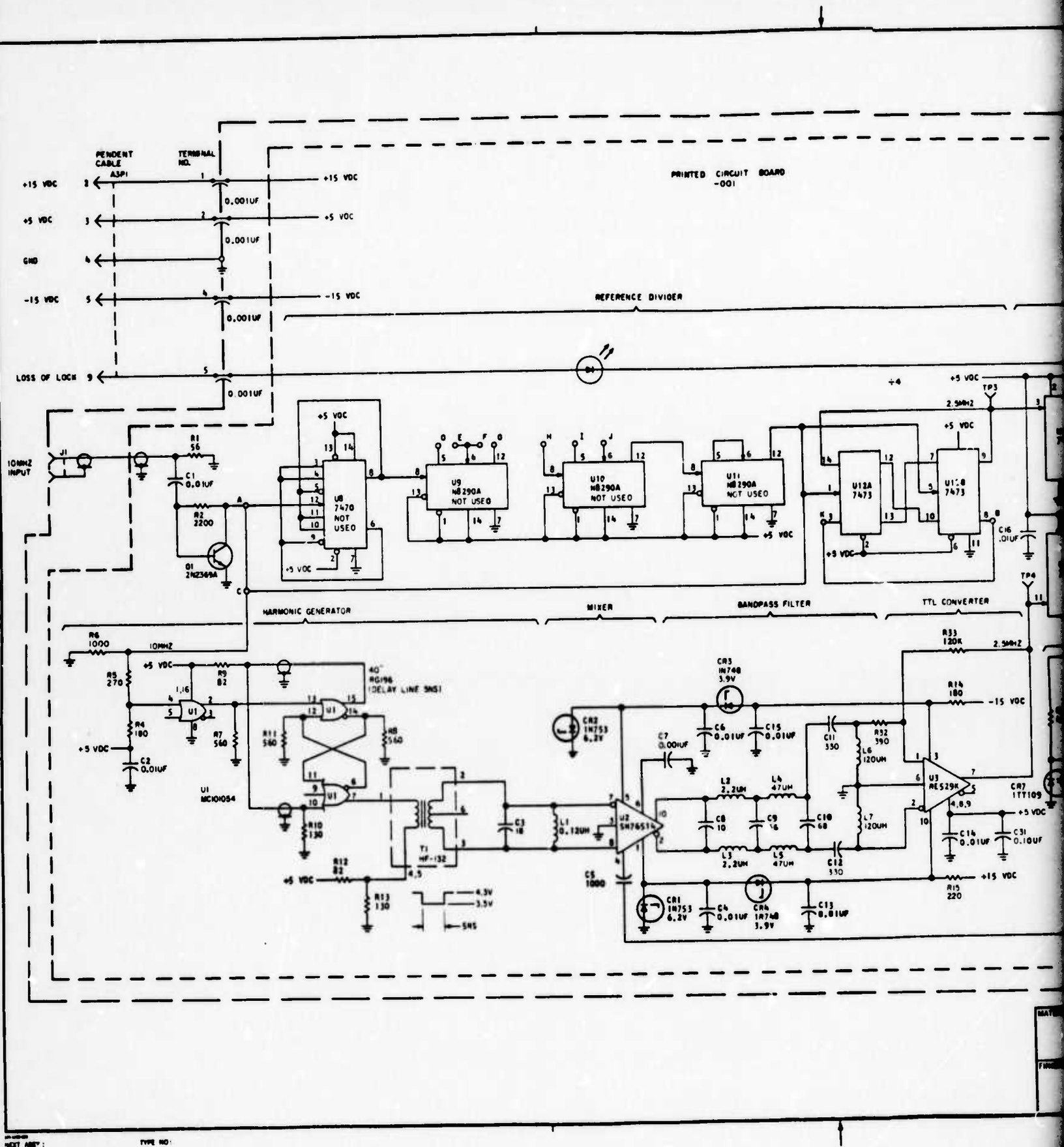
MATERIAL	UNLESS OTHERWISE SPECIFIED	CONTRACT NO	COLLINS RADIO COMPANY
FINISH	DIMENSIONS ARE IN INCHES, TOL ON DEC DIM.: .XX = ±.02, .XXX = ±.008 HOLE DIAMETERS: UNDER .251 DIA = +.005 -.005 .251 TO .500 DIA = +.006 -.005 OVER .500 DIA = +.008 -.005 ANGLES: ±1.0° ECCENTRICITY BETWEEN DIA ON AN AXIS NOT TO EXCEED .010 DIA PART SHALL COMPLY TO 540-6400-001	PREP E. ANDERSEN 7-73 CHK APVD	DALLAS TEX NEWPORT BEACH CALIF CEDAR RAPIDS IA WIRING DIAGRAM A2A3 MULTIPLIER PACKET R3 TEST XMTR SIZE D · CODE IDENT 13499 · DWG NO 627-9597 SCALE NONE · SHEET

PRO ☐ NFP ☐ REL ☐ REV ___ TO ___ ± OR ∠ MB 2 DL 2 10 ☐

B



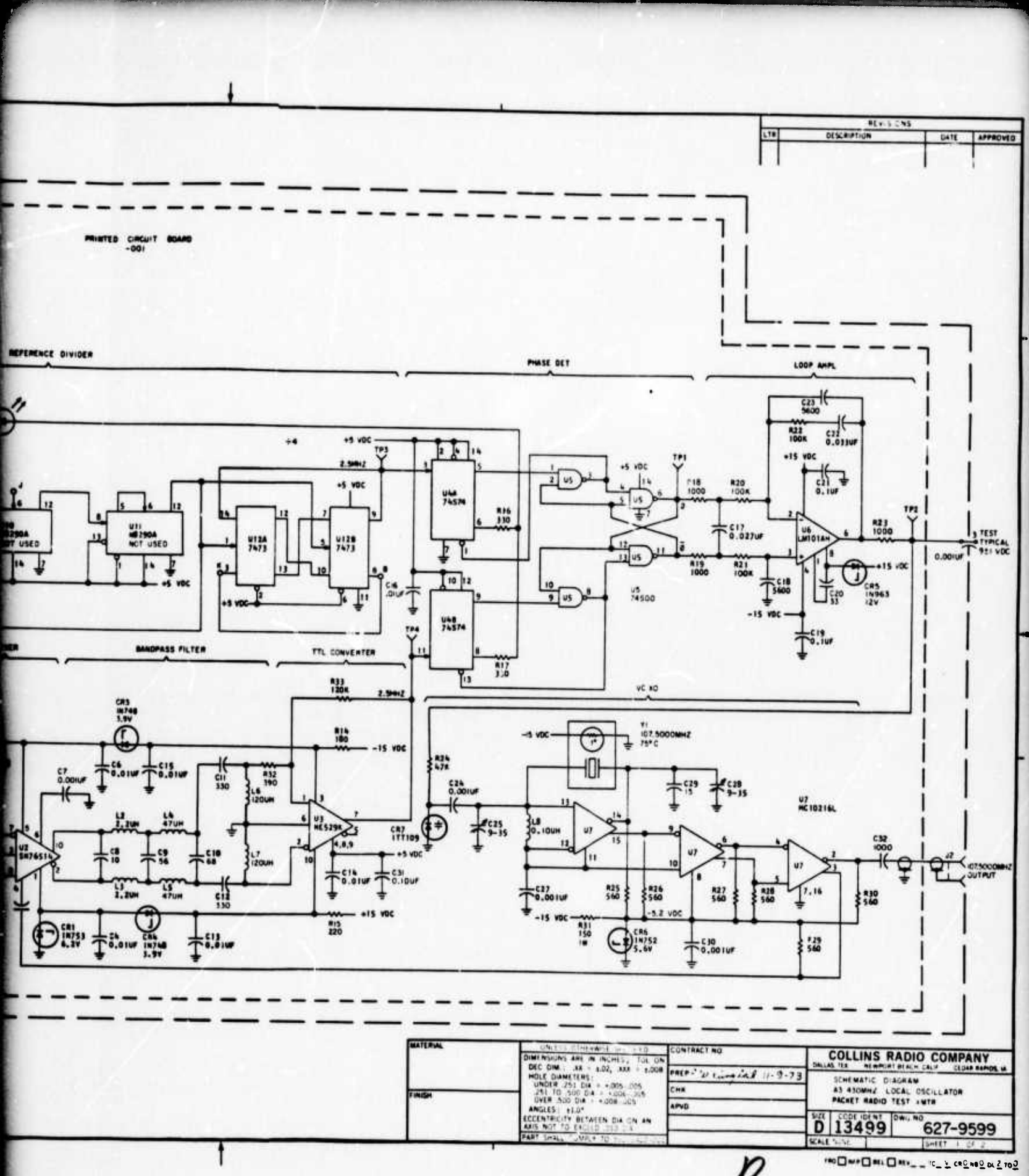
A3 - 430 MHZ XMTR LO



NEXT ASSY:

TYPE NO:

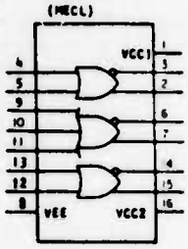
A


REVISIONS
LTR
DESCRIPTION
DATE
APPROVED
PRINTED CIRCUIT BOARD
-001
REFERENCE DIVIDER
PHASE DET
LOOP AMPL
BANDPASS FILTER
TTL CONVERTER
VC XO
÷4
+5 VDC
2.5MHZ
U11
MB290A
NOT USED
U12A
7473
U12B
7473
U4A
74S74
U4B
74S74
U5
74S00
R36
330
R17
330
R18
1000
R19
1000
R20
100K
R21
100K
R22
100K
R23
1000
C16
.01UF
C17
0.027UF
C18
5600
C19
0.1UF
C20
33
C21
0.1UF
C22
0.033UF
C23
5600
U6
LM101AH
CR5
1N963
12V
+15 VDC
-15 VDC
TP1
TP2
TP3
TP4
TEST
TYPICAL
9.1 VDC
0.001UF
R33
120K
2.5MHZ
CR3
1N748
3.9V
R14
180
C7
0.001UF
C6
0.01UF
C15
0.01UF
C11
330
R32
390
L6
120UH
L2
2.2UH
L4
47UH
C8
10
C9
56
C10
68
L7
120UH
L3
2.2UH
L5
47UH
C12
330
U2
SN76514
U3
ME529K
4,8,9
C14
0.01UF
C31
0.1UF
CR7
1TT109
R15
220
CR1
1N753
6.2V
C4
0.01UF
CR4
1N748
3.9V
C13
0.01UF
R24
47K
C24
0.001UF
C25
9-35
Y1
107.5000MHZ
75°C
C29
15
C28
9-35
U7
MC10216L
L8
0.10UH
C27
0.001UF
R25
560
R26
560
R27
560
R28
560
R29
560
R30
560
R31
150
1W
CR6
1N752
5.6V
C30
0.001UF
C32
1000
7,16
-5.2 VDC
107.5000MHZ
OUTPUT
MATERIAL
FINISH
CONTRACT NO
PREP
CHK
APVD
COLLINS RADIO COMPANY
DALLAS, TEX NEWPORT BEACH, CALIF CEDAR RAPIDS, IA
SCHEMATIC DIAGRAM
A3 430MHZ LOCAL OSCILLATOR
PACKET RADIO TEST XMTR
SIZE
D
CODE IDENT
13499
DWG NO
627-9599
SCALE NONE
SHEET 1 OF 2

B

NOTES:

1. U1 MC10105L (MECL)



2. T1 Z-MATCH RF 132

BOTTOM VIEW

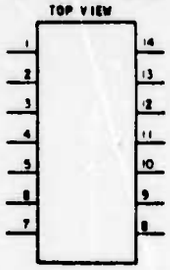
3. U2 SN76514

TOP VIEW

1	+VCC
2	OUTPUT
3	FLOATING GND
4	LOCAL OSC INPUT
5	-VCC
6	DECOUPLE 1
7	DECOUPLE 2
8	RF INPUT
9	A C
10	OUTPUT

4. U9 THRU U11 MB2504

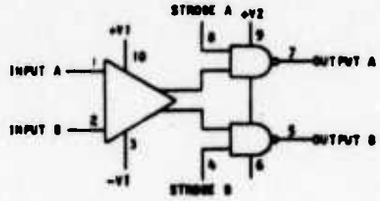
TOP VIEW



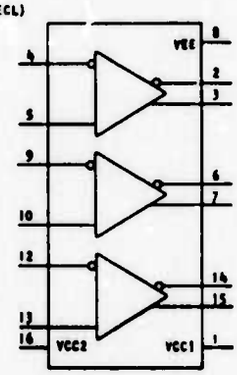
1	DATA STROBE
2	C OUT
3	DATA C
4	DATA A
5	A OUT
6	CLOCK 2
7	GND
8	CLOCK 1
9	B OUT
10	DATA B
11	DATA D
12	D OUT
13	DATA RESET
14	VCC

5. U3 ME529K

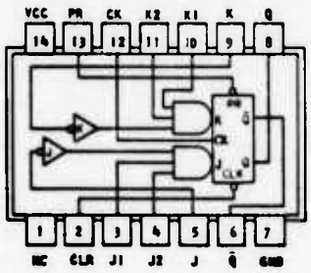
TOP VIEW



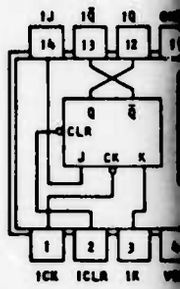
6. U7 MC10216L
TRIPPLE DIFF AMP (MECL)



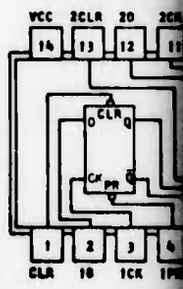
7. U8 TI 7470



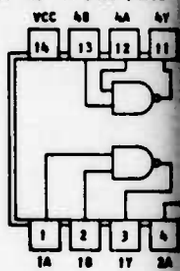
8. U12 TI 7473



9. U4 TI 7474 74S74



10. U5 TI 7400 74S00



NEXT ASSY: TYPE MD:

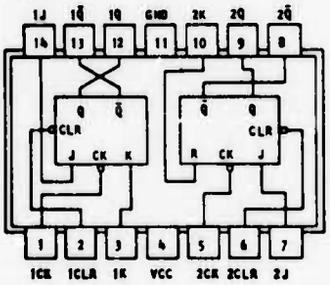
A

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED

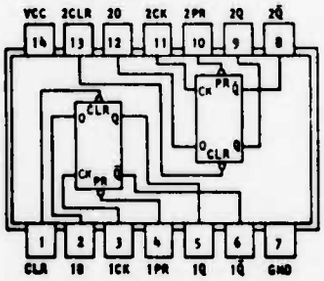
OUTPUT A

OUTPUT B

8. U12 TI 7473

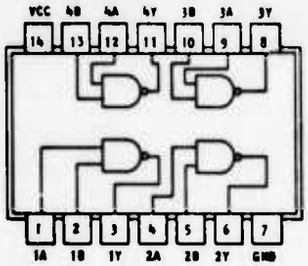


9. U4 TI 7474 74S74



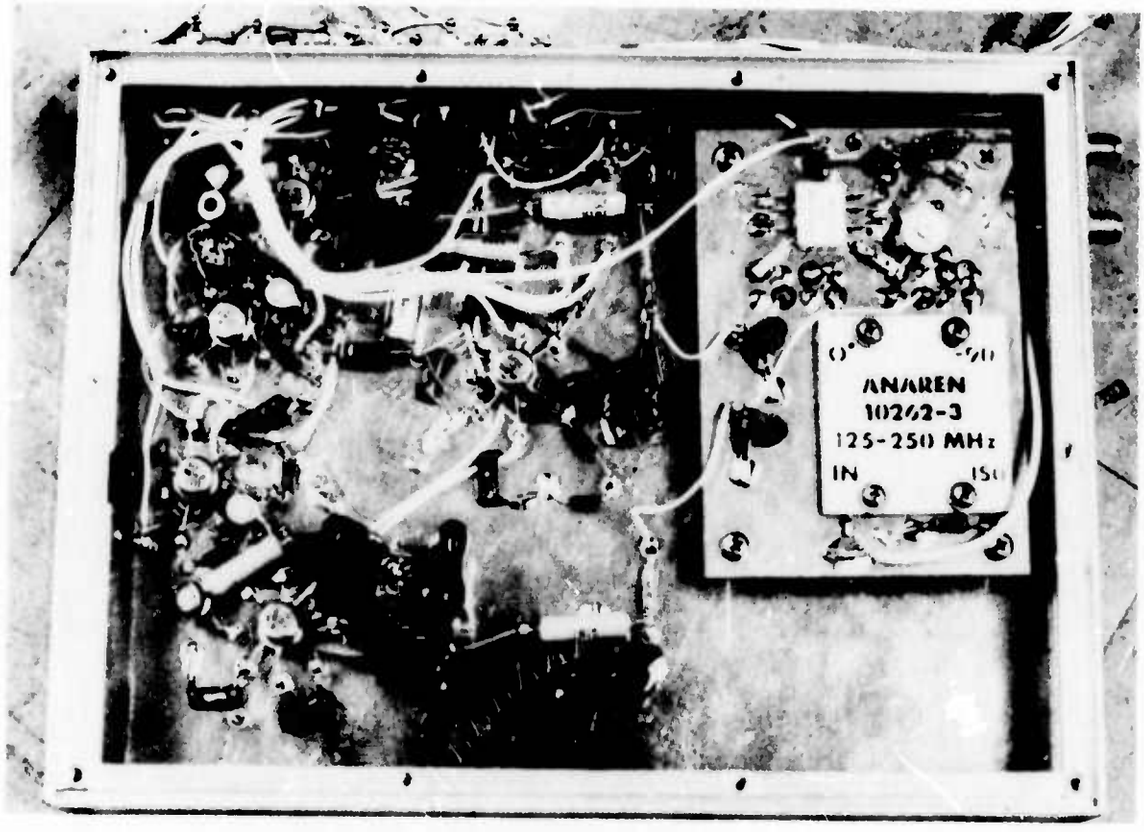
11. UNLESS OTHERWISE SPECIFIED
ALL RESISTANCE VALUES ARE IN OHMS
ALL RESISTORS ARE 1/4 W CARBON
ALL CAPACITANCE VALUES ARE IN PICOFARADS.

10. U5 TI 7400 74S00

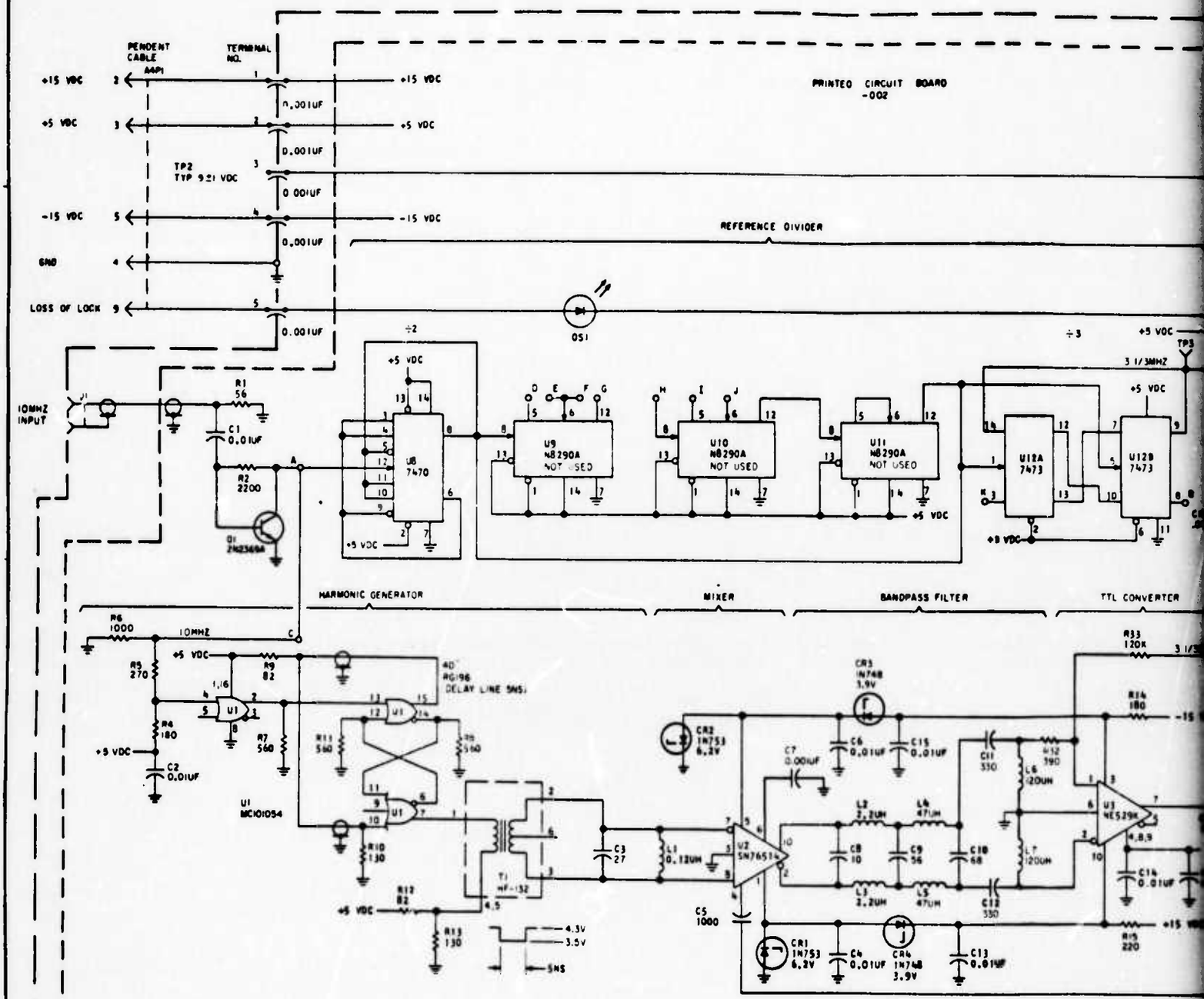


SIZE	CODE IDENT	DWG NO
D	13499	627-9599
SCALE NONE	REV	SHEET 2 OF 2

B



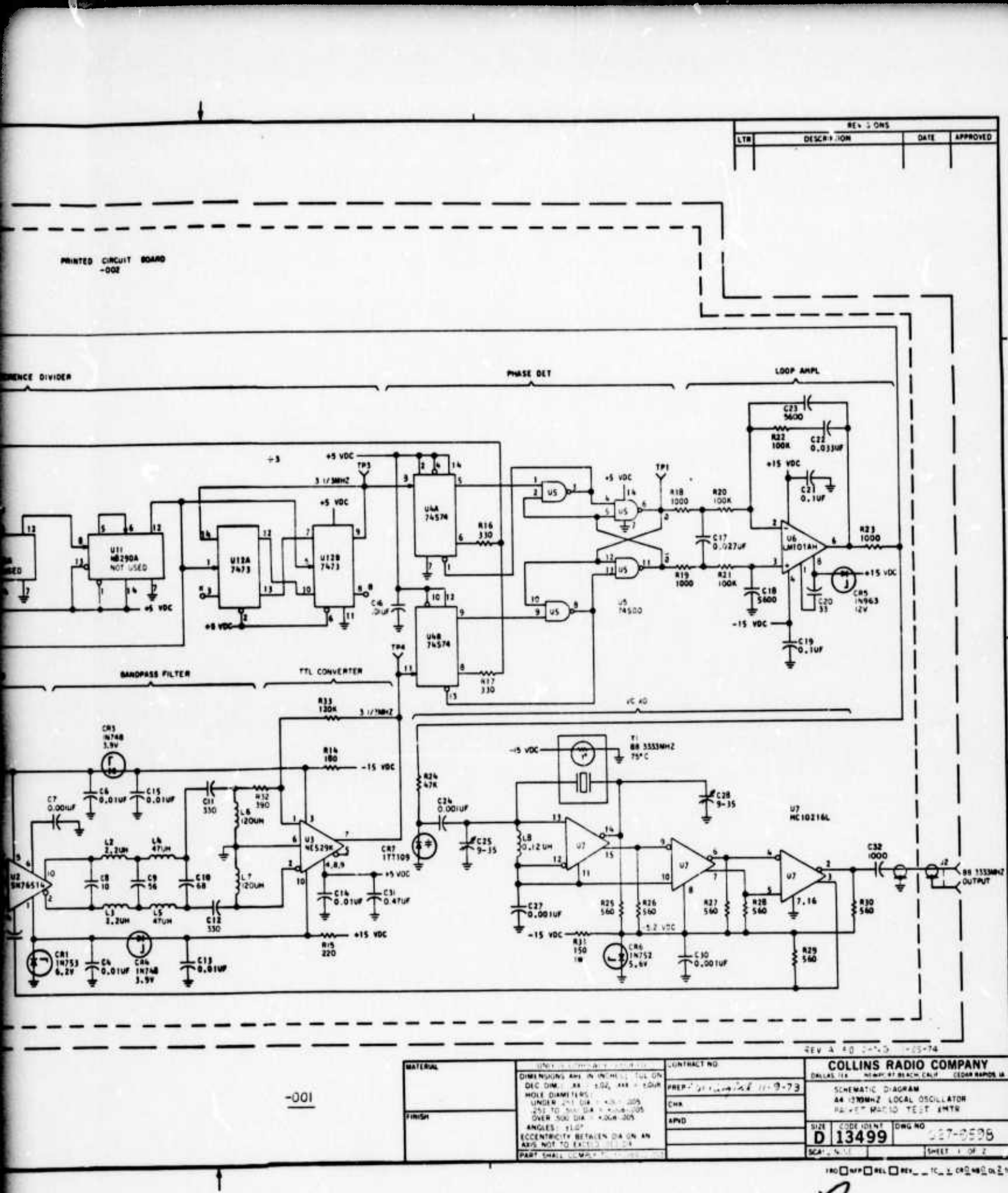
A4 - 1370 MHZ XMTR LO



-001

EXT ASSY: TYPE NO:

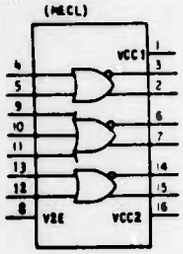
A


REVISIONS
LTR
DESCRIPTION
DATE
APPROVED
PRINTED CIRCUIT BOARD
-002
PHASE DET
LOOP AMPL
BANDPASS FILTER
TTL CONVERTER
+5 VDC
-15 VDC
+15 VDC
3 1/3MHZ
88 3333MHZ
88 3333MHZ OUTPUT
U11 MB290A NOT USED
U12A 7473
U12B 7473
U4A 74S74
U4B 74S74
U5 74S00
U6 MC101AH
U7 MC10216L
U2 SN76514
U3 ME5296
CR1 1N753 6.2V
CR3 1N748 3.9V
CR4 1N748 3.9V
CR6 1N752 5.6V
CR7 177109
T1 88 3333MHZ 75°C
-001
MATERIAL
FINISH
CONTRACT NO
PREP
CHK
APVD
COLLINS RADIO COMPANY
DALLAS, TEX NEWPORT BEACH, CALIF CEDAR RAPIDS, IA
SCHEMATIC DIAGRAM
44 1333MHZ LOCAL OSCILLATOR
SIZE D
CODE IDENT 13499
DWG NO 627-0608
SHEET 1 OF 2

B

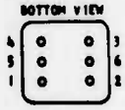
NOTES:

1. U1 MC1010SL (MECL)



2. T1 2-MATCH HF 132

BOTTOM VIEW



3. U2 SN76514

TOP VIEW

1 +VCC
2 OUTPUT
3 FLOATING GND
4 LOCAL OSC INPUT
5 -VCC
6 DECOUPLE 1
7 DECOUPLE 2
8 RF INPUT
9 R C
10 OUTPUT

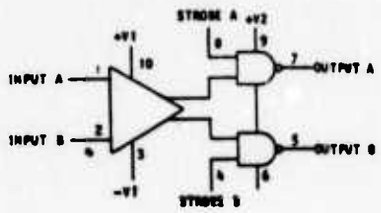
4. U9 THRU U11 MB290A

TOP VIEW

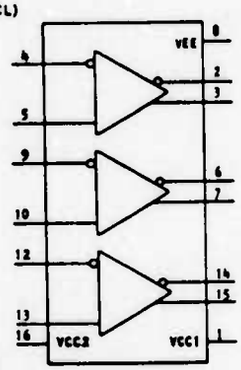
1 DATA STROBE
2 C OUT
3 DATA C
4 DATA A
5 A OUT
6 CLOCK 2
7 GND
8 CLOCK 1
9 B OUT
10 DATA B
11 DATA D
12 B OUT
13 DATA RESET
14 VCC

5. U3 ME529K

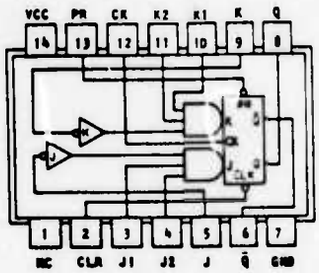
TOP VIEW



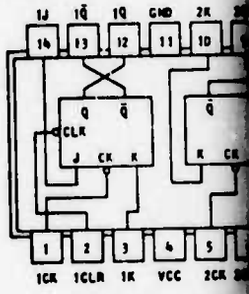
6. U7 MC1D216L
TRIPPLE DIFF AMP (MECL)



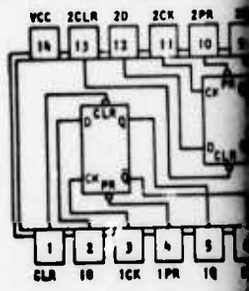
7. U8 TI 7470



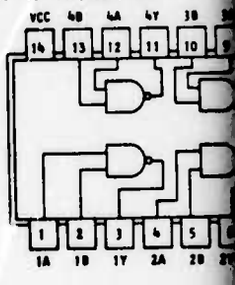
8. U12 TI 7473



9. U4 TI 7474 74S74



10. U5 TI 7400 74S00



A

NEXT ASSY:

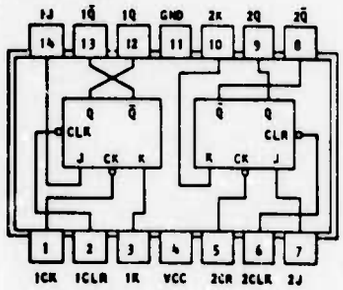
TYPE NO:

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED

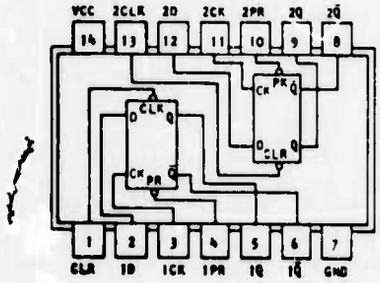
OUTPUT A

OUTPUT B

8. U12 TI 7473

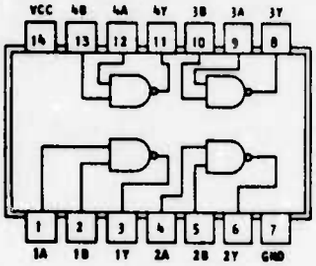


9. U4 TI 7474 74S74



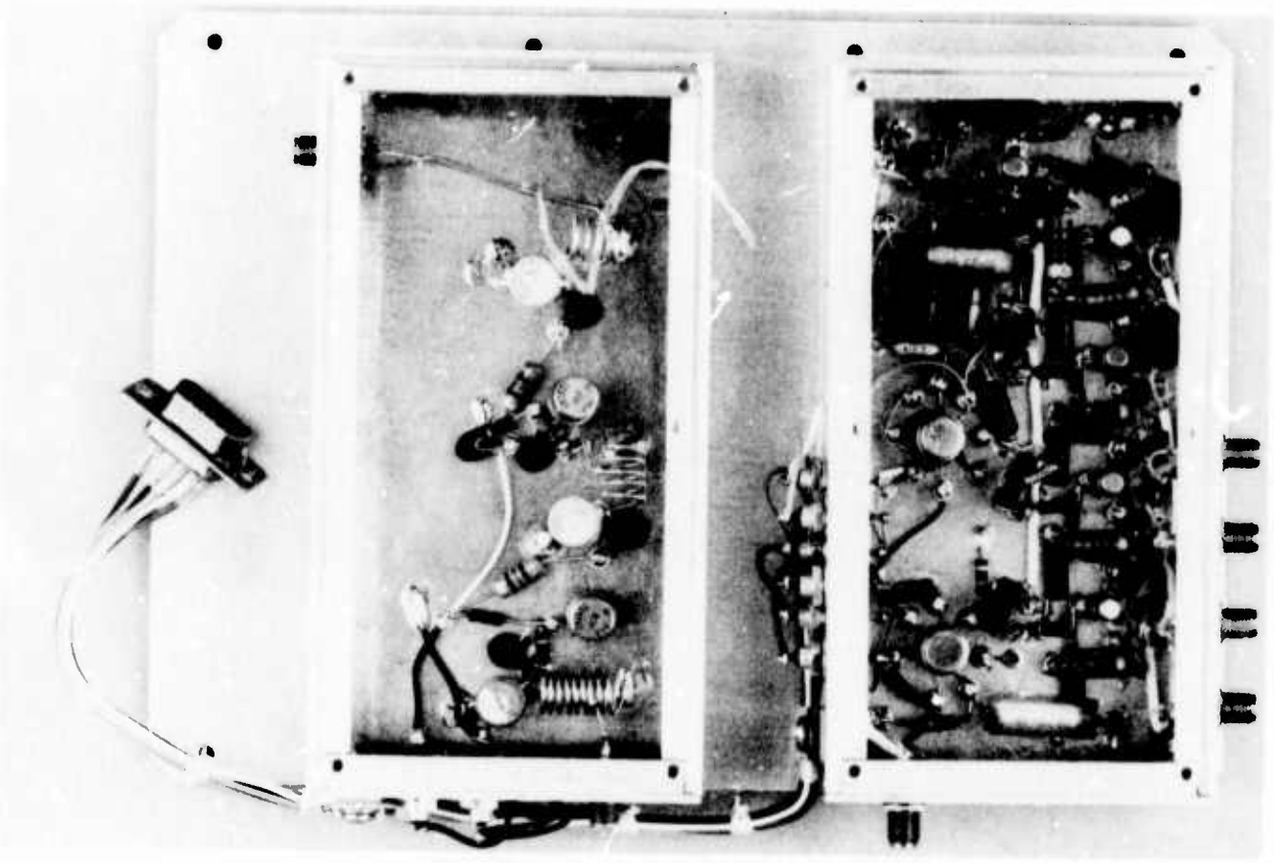
11. UNLESS OTHERWISE SPECIFIED
ALL RESISTANCE VALUES ARE IN OHMS
ALL RESISTORS ARE 1/4 W CARBON
ALL CAPACITANCE VALUES ARE IN PICOFARADS.

10. U5 TI 7400 74S00



B

SIZE	CODE IDENT	DWG NO
D	13499	[illegible]-3593
SCALE NONE	REV	SHEET 2 OF 2



NOTES:
1. LM 104 (BOTTOM VIEW)

PIN 1. ADJUST
2. REFERENCE
3. REF SUPPLY
4. COMPENSATION
5. UNREGULATED INPUT (CONNECTED TO CASE)
6. CURRENT LIMIT
7. BOOSTER
8. REGULATED OUTPUT
9. GROUND
10. NO CONNECTION

2. UA 723 (BOTTOM VIEW)

PIN 1. CURRENT SENSE
2. INVERTING INPUT
3. NON INVERTING INPUT
4. V REF
5. -V (CONNECTED TO CASE)
6. V OUT
7. V OUTPUT COLLECTOR
8. V+
9. FREQUENCY COMPENSATION
10. CURRENT LIMIT

3. PENDENT CABLE IS NO. 22 TEFLON WIRE OF COLOR CODE NOTED IN ()

TERMINAL NO.
OR COAX NO.

P/O AS 91 PENDENT CABLE

+15V 2 (1) 1 .001 μF

GND 4 (10) 2 .001 μF

-15V 5 (5) 3 .001 μF

8370Ω 1%

15Ω

LM 104

2700Ω 1%

10 μF

50UF

μA 723

8.2 K

1K

4.7 μF

1 μH

10 MHZ INPUT J5

2.2 μF

2N2222

56Ω

220Ω

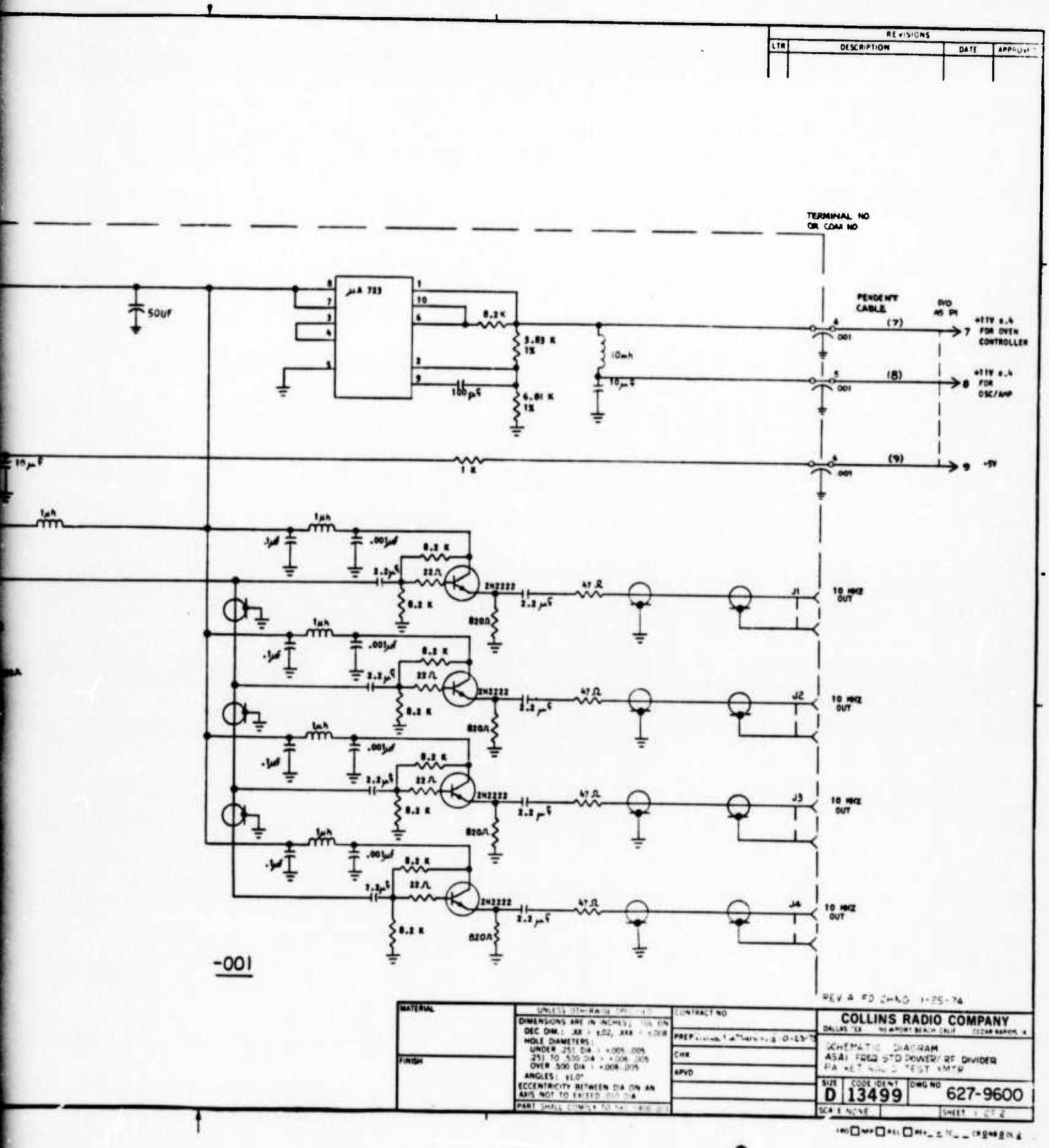
.1 μF

.001 μF

-001

NEXT ASSY: TYPE NO:

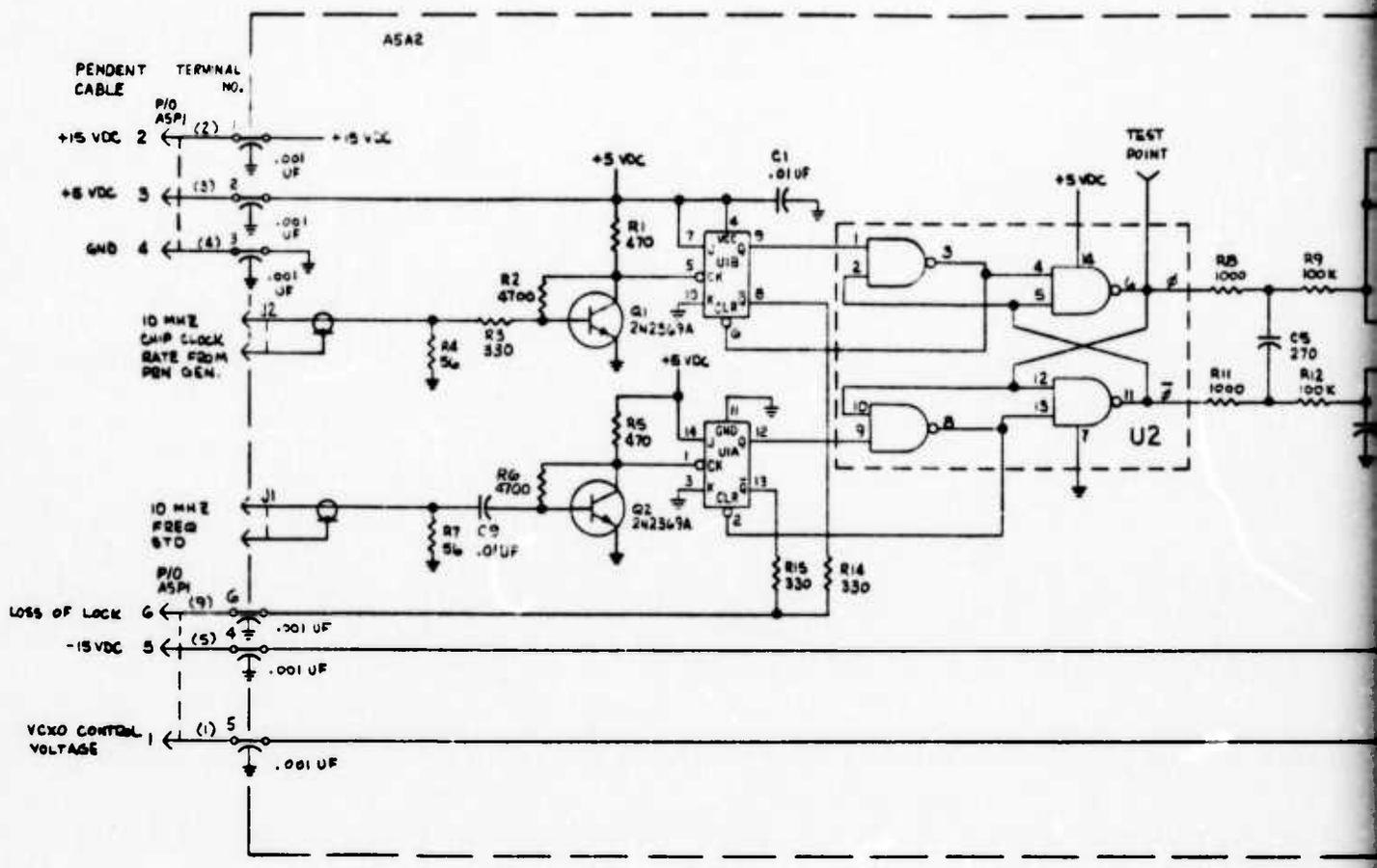
A


REVISIONS
LTR
DESCRIPTION
DATE
APPROVED
TERMINAL NO OR COAX NO
PENDENT CABLE
DVD AS PN
50UF
μA 723
8.2 K
3.83 K 1%
6.81 K 1%
100 pF
10mh
10 μF
001
(7)
+11V ± .4 FOR OVEN CONTROLLER
(8)
+11V ± .4 FOR OSC/AMP
1 K
(9)
+5V
1μh
.1μF
.001μF
2.2 μF
22Ω
2N2222
820Ω
47Ω
J1
J2
J3
J4
10 MHZ OUT
-001
REV A TO DWG 1-25-74
MATERIAL
FINISH
UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
DEC DIM: XX ± .02, XXX ± .010
HOLE DIAMETERS:
UNDER 251 DIA +.005 -.005
251 TO 500 DIA +.006 -.005
OVER 500 DIA +.008 -.010
ANGLES: ±1.0°
ECCENTRICITY BETWEEN DIA ON AN AXIS NOT TO EXCEED .010 DIA
PART SHALL CONFORM TO
CONTRACT NO
PREPARED
CHK
APVD
COLLINS RADIO COMPANY
DALLAS TEX NEWPORT BEACH CALIF CEDAR RAPIDS IA
SCHEMATIC DIAGRAM
ASAI FREQ STD POWER/RF DIVIDER
PA NET
SIZE D
CODE IDENT 13499
DWG NO 627-9600
SCALE NONE
SHEET 1 OF 2

B

NOTES:

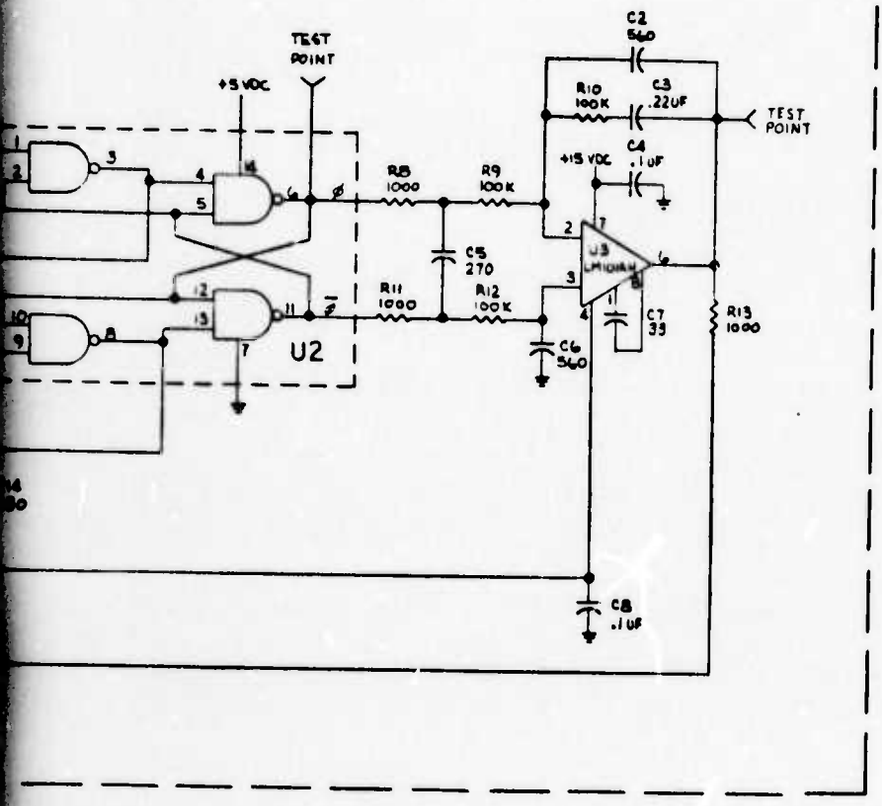
1. ALL RESISTORS 1/4 W 10% UNLESS OTHERWISE NOTED.
2. ALL CAPACITORS IN PICOFARADS UNLESS OTHERWISE NOTED.
3. U2 IS 74S00
4. U1 IS 74S73



NEXT ASSY: TYPE

A

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED

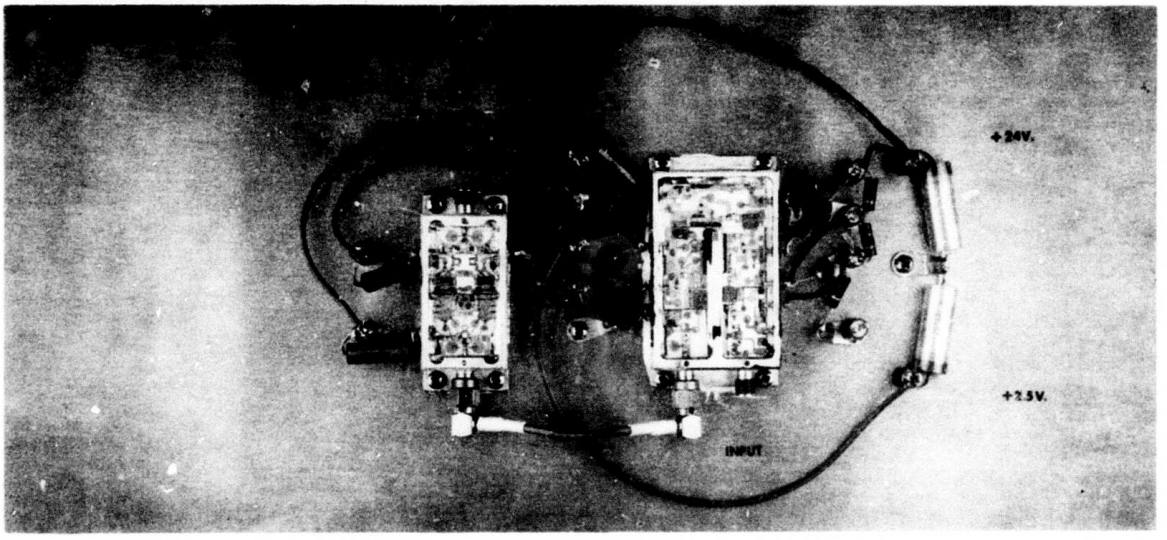


REV A ED CHG 1-25-74

MATERIAL	UNLESS OTHERWISE SPECIFIED	CONTRACT NO	COLLINS RADIO COMPANY
FINISH	DIMENSIONS ARE IN INCHES, TOL ON DEC DIM.: .XX ± .02, .XXX ± .008 HOLE DIAMETERS: UNDER .251 DIA +.005 -.005, .251 TO .500 DIA +.006 -.005, OVER .500 DIA +.008 -.005 ANGLES: ±1.0° ECCENTRICITY BETWEEN DIA ON AN AXIS NOT TO EXCEED .010 DIA PART SHALL COMPLY TO SPEC [illegible]	PREP J MCLEY 1-6-73 CHK APVD	DALLAS TX [illegible] CEDAR RAPIDS IA SCHEMATIC DIAGRAM ASA2 PHASE LOCK PACKET RADIO TEST AMTR
			SIZE D · CODE IDENT 13499 · DWG NO 627-9600 SCALE [illegible] · SHEET 2 OF 2

NEXT ☐ NEXT ☐ REL ☐ REV [illegible] AND DELETED ☐

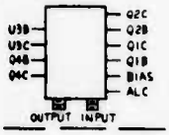
B



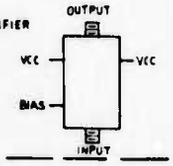
A9 - 430 MHZ PA

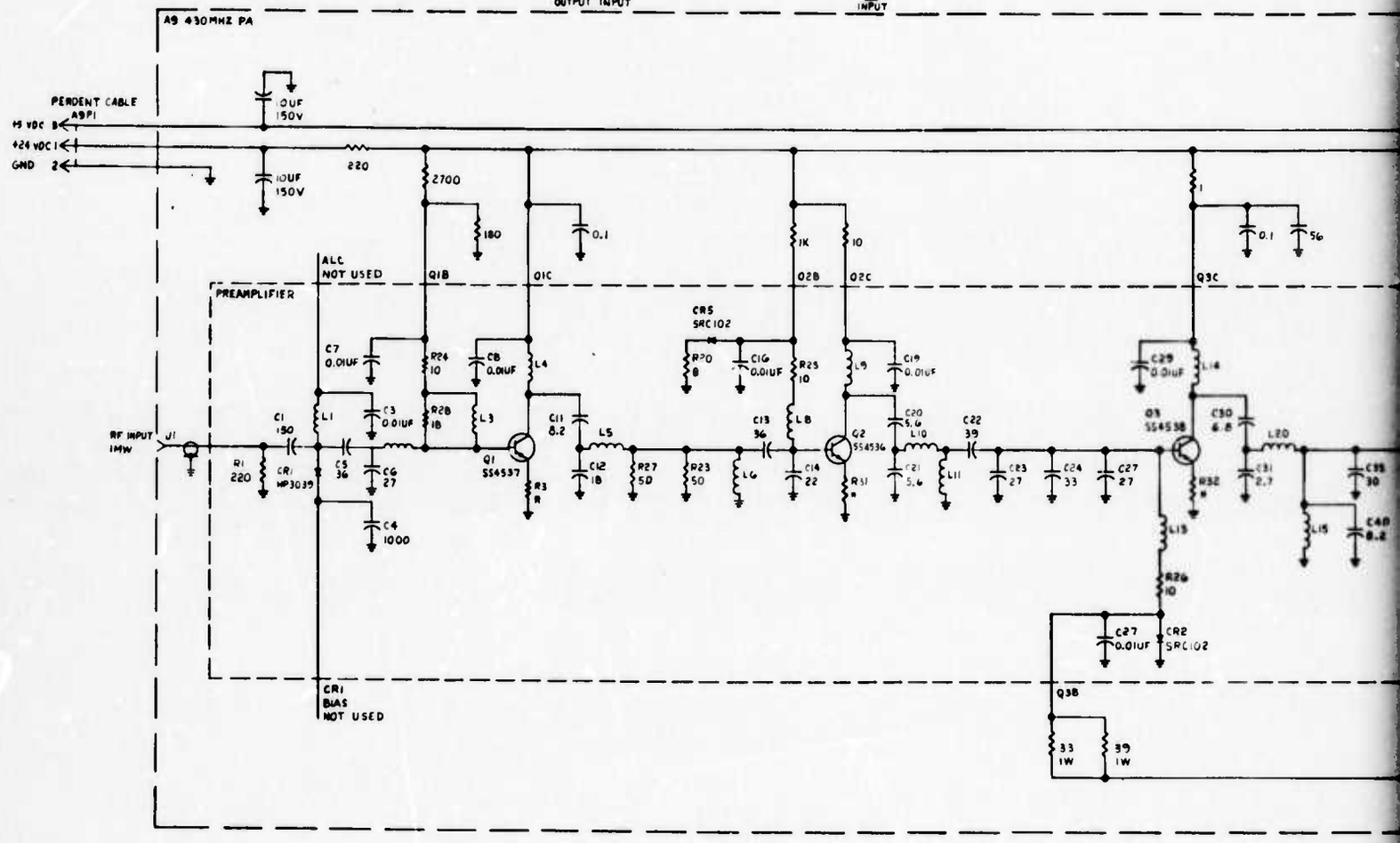
NOTES.
1. UNLESS OTHERWISE SPECIFIED
ALL RESISTANCE VALUES ARE IN OHMS.
ALL CAPACITANCE VALUES ARE IN PICOFARADS.
ALL INDUCTANCE VALUES ARE IN NANOHENRYS.
2. R30, R31, R32 AND R33, AS INDICATED BY ASTERISK (*) ARE A PART OF TRANSISTORS Q1, Q2, Q3, AND Q4.

3. PREAMP



4. AMPLIFIER



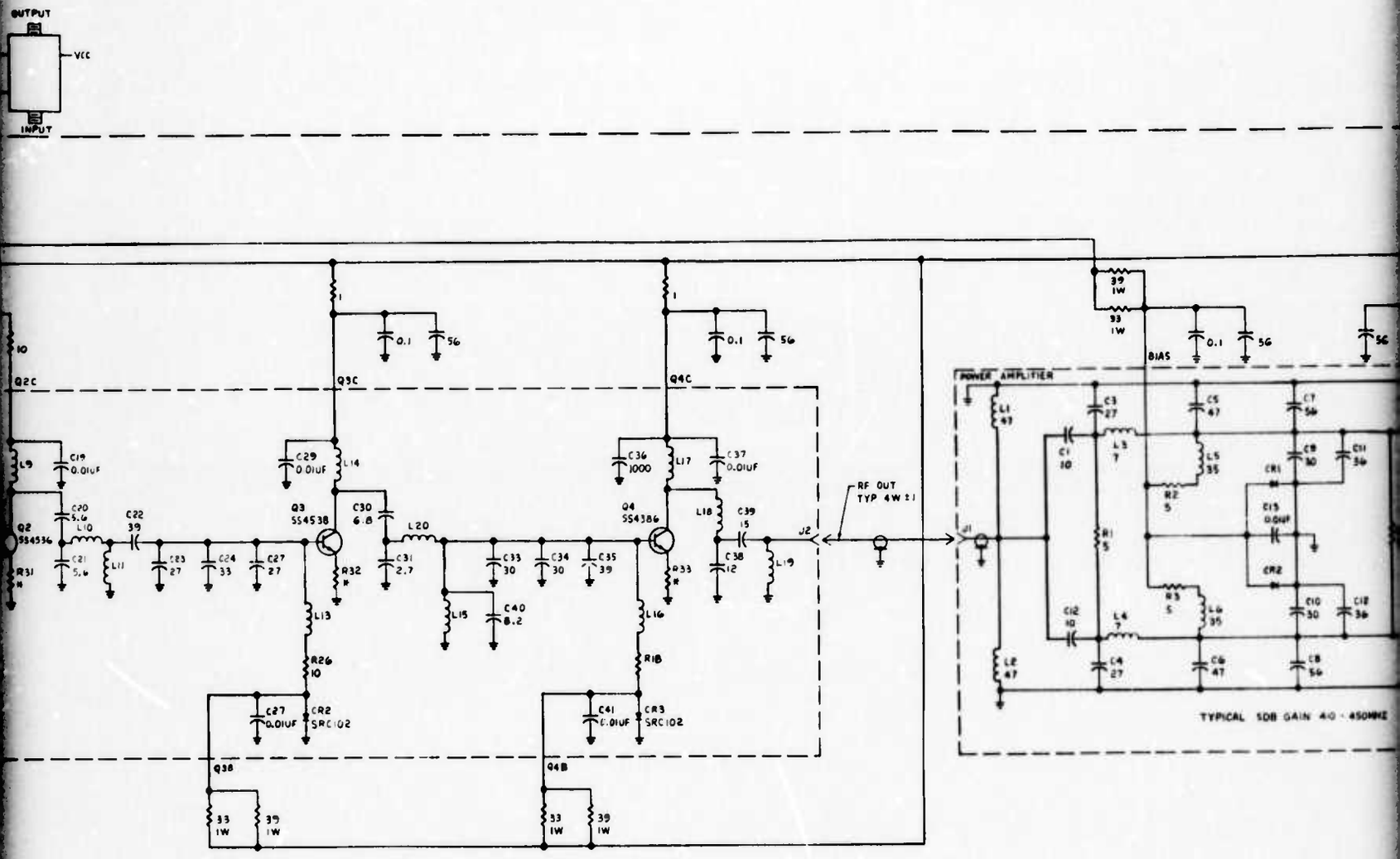


627-9651	3/3

627-9651	2/3

A

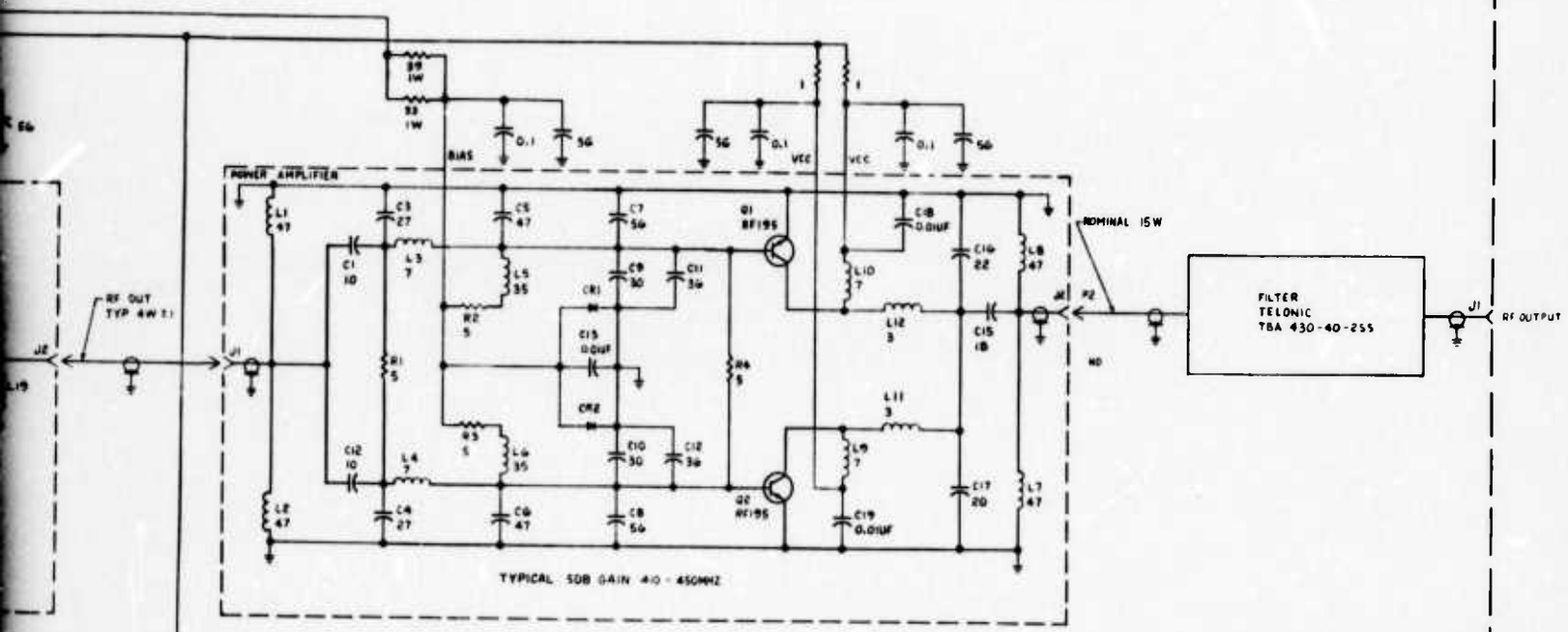
B



B

PART NUMBER	FRAME
627-9651	1/3

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED



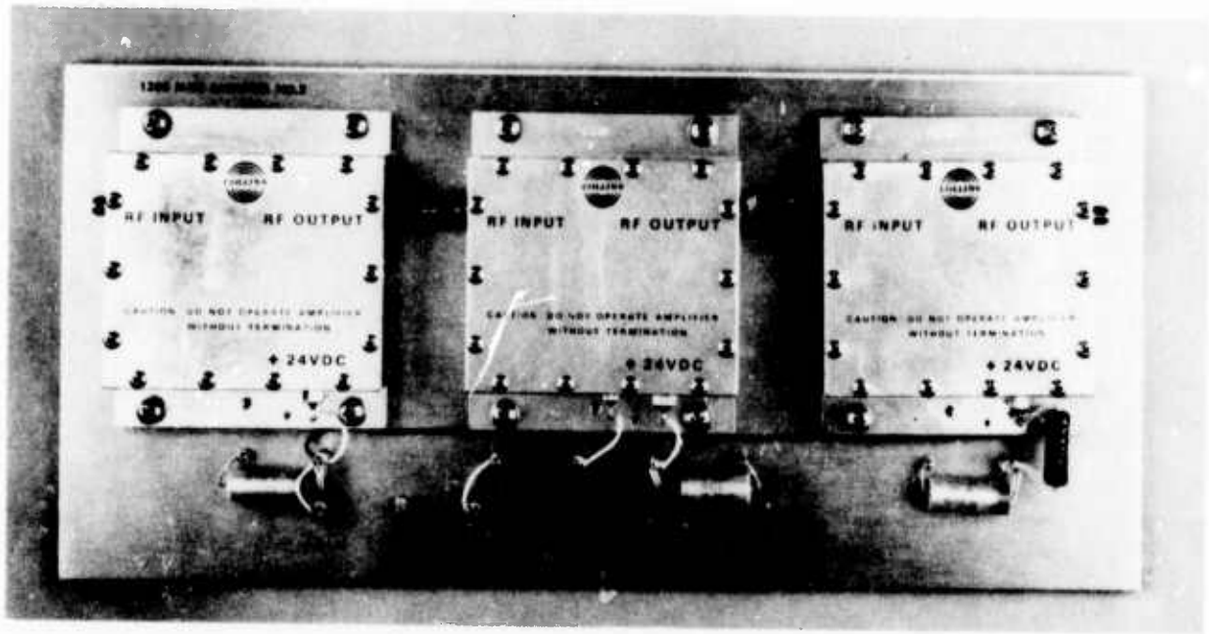
-001

PUBLICATIONS DRAWING
REVISIONS TO BE APPROVED AND MADE BY PUBLICATIONS ILLUSTRATING DEPARTMENT

CONTRACT NO	COLLINS RADIO COMPANY DALLAS, TEX. NEWPORT BEACH, CALIF. CEDAR RAPIDS, IA.
PREP'D [illegible] 11-19-73	SCHEMATIC DIAGRAM A9 430MHZ PA PACKET RADIO TEST XMTR
CHK	
APVD	SIZE D. CODE IDENT 13499 DWG NO 627-9651
	SCALE NONE SHEET

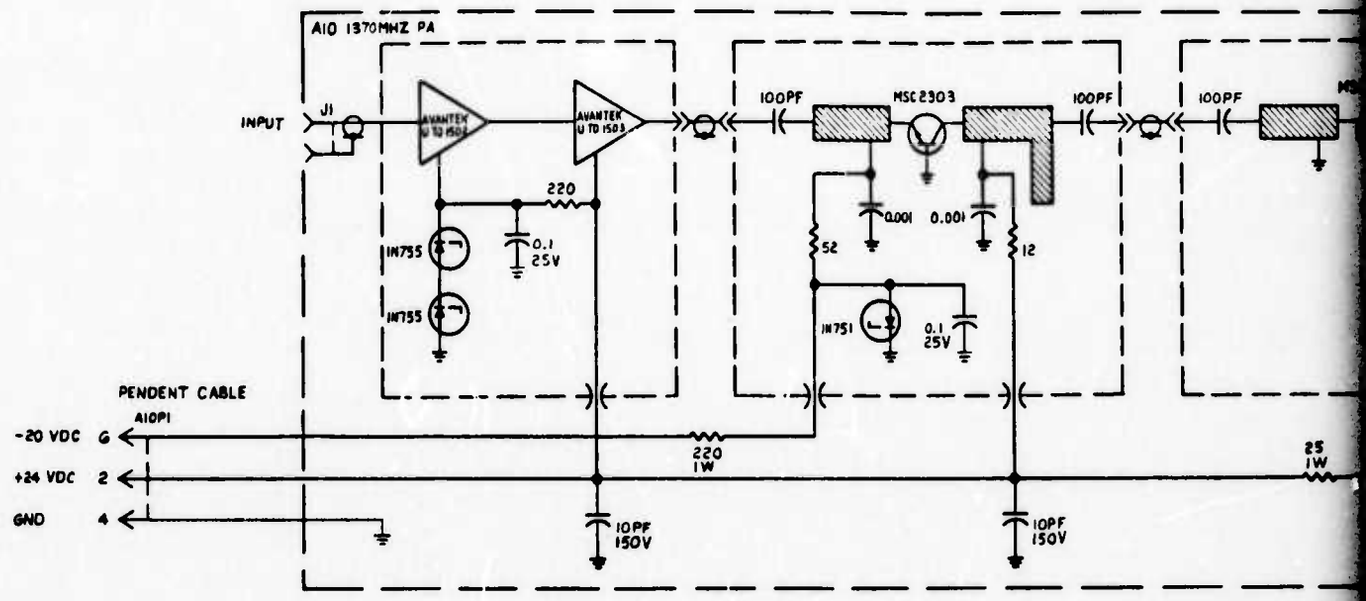
8020

PART NUMBER	FRAME
627-9651	1/3



A10 - 1370 MHZ PA

NOTES:
1. UNLESS OTHERWISE SPECIFIED
   ALL RESISTANCE VALUES ARE IN OHMS
   ALL CAPACITANCE VALUES ARE IN MICROFARADS

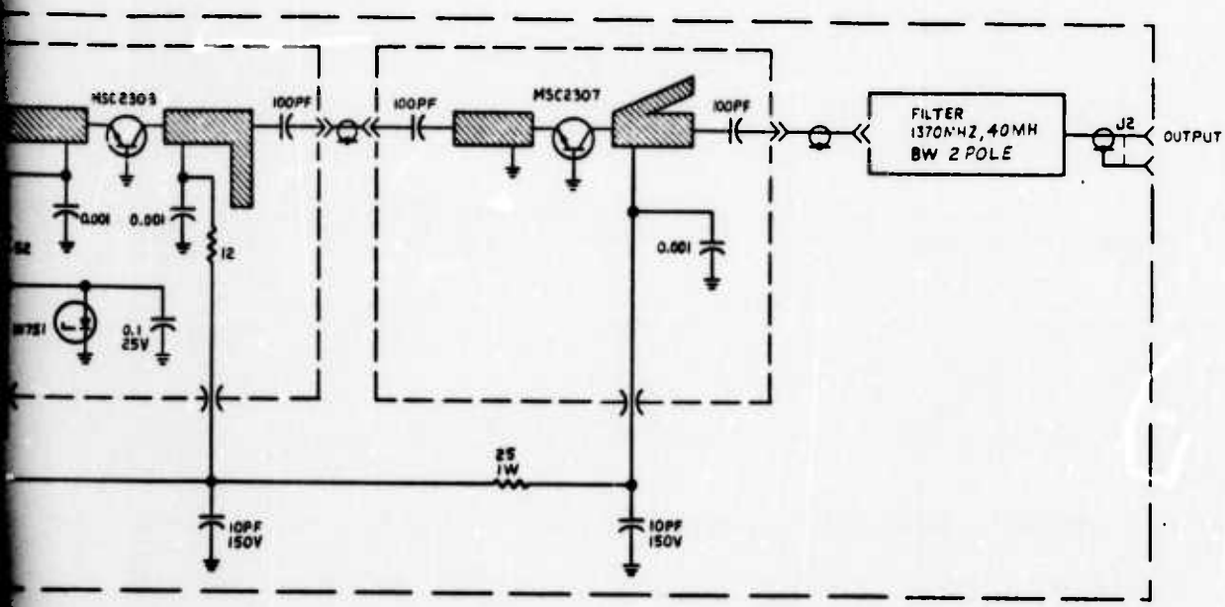


-001

NEXT ASSY: TYPE NO:

A

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED

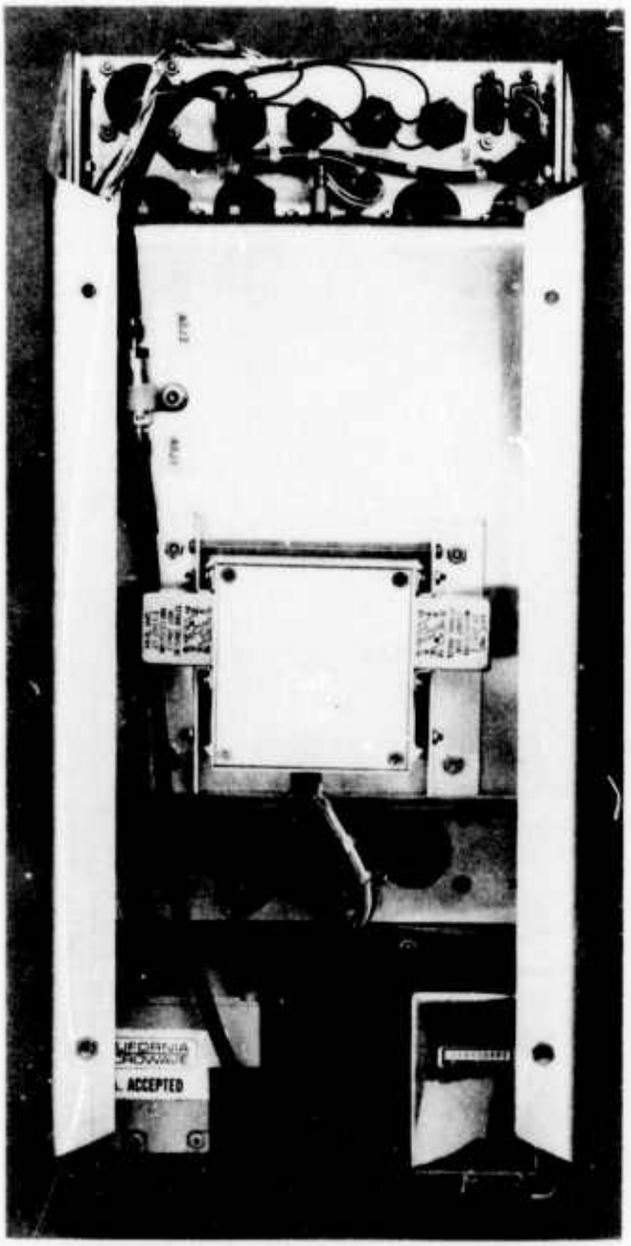


-001

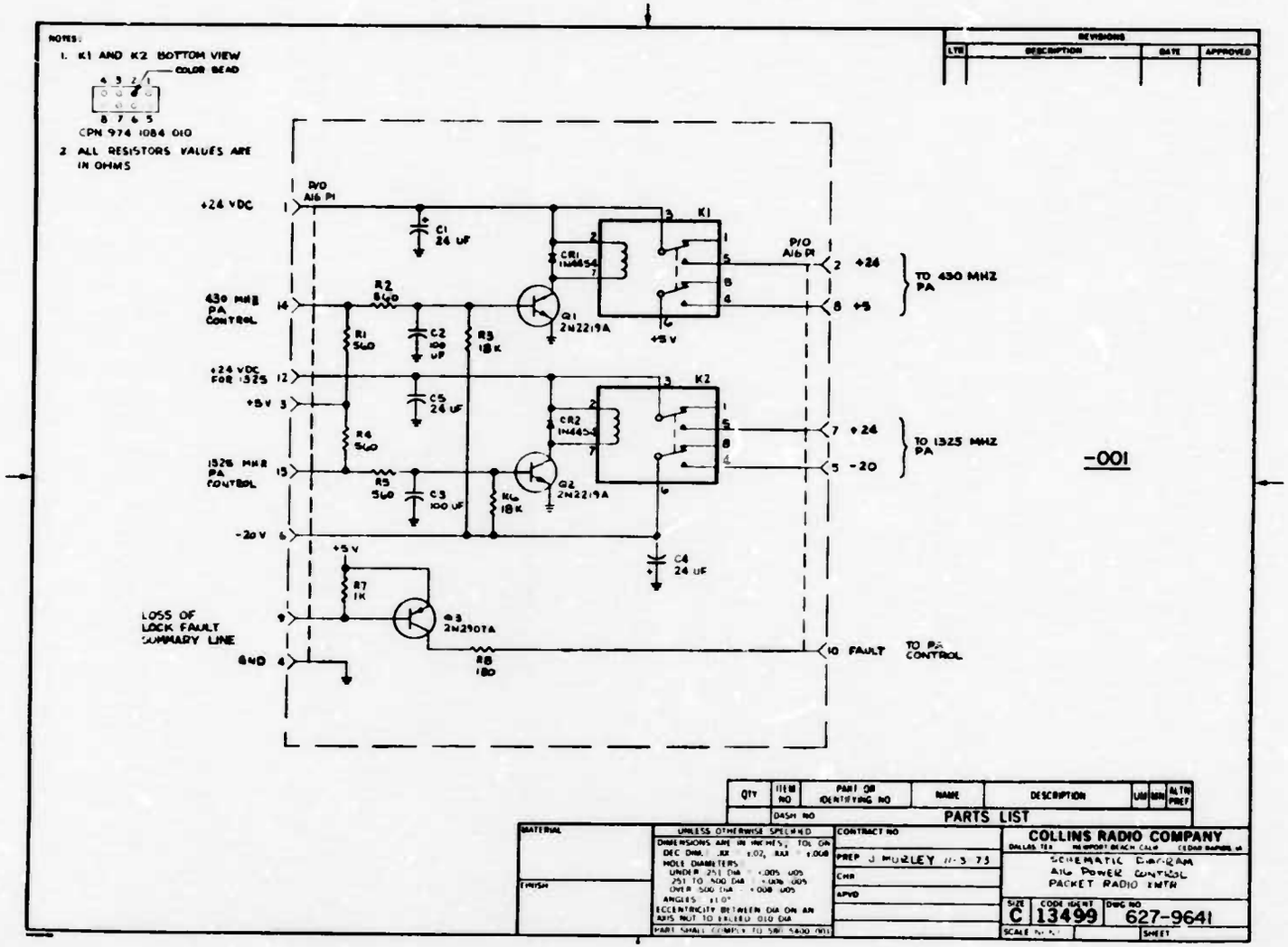
MATERIAL	UNLESS OTHERWISE SPECIFIED	CONTRACT NO	COLLINS RADIO COMPANY
	DIMENSIONS ARE IN INCHES; TOL ON DEC DIM.: XX = ±.02, XXX = ±.008	PREP	DALLAS, TEX NEWPORT BEACH, CALIF CEDAR RAPIDS, IA
FINISH	HOLE DIAMETERS: UNDER .251 DIA = +.005 -.005; .251 TO .500 DIA = +.006 -.005; OVER .500 DIA = +.008 -.005	CHK	SCHEMATIC DIAGRAM AIO 1370MHZ PA PACKET RADIO TEST SET
	ANGLES: ±1.0°	APVD	SIZE D | CODE IDENT 13499 | DWG NO 627-9652
	ECCENTRICITY BETWEEN DIA ON AN AXIS NOT TO EXCEED .010 DIA		SCALE NONE | SHEET
	PART SHALL COMPLY TO SRO 5400.001		

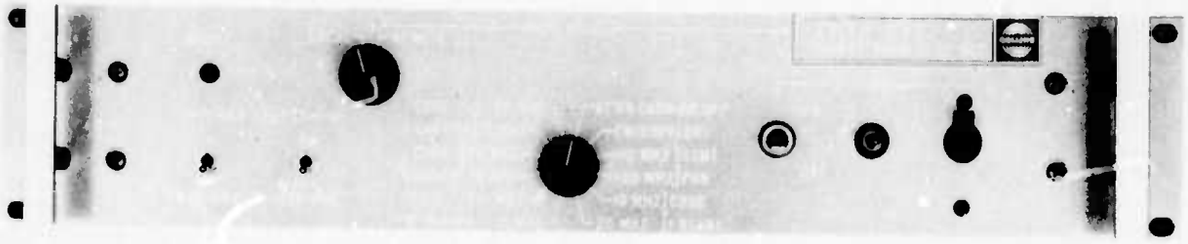
PRO ☐ NFP ☐ RE. ☐ REV ___ TC _X_ CR ☐ NO ☐ DL ☐ TO ☐

B

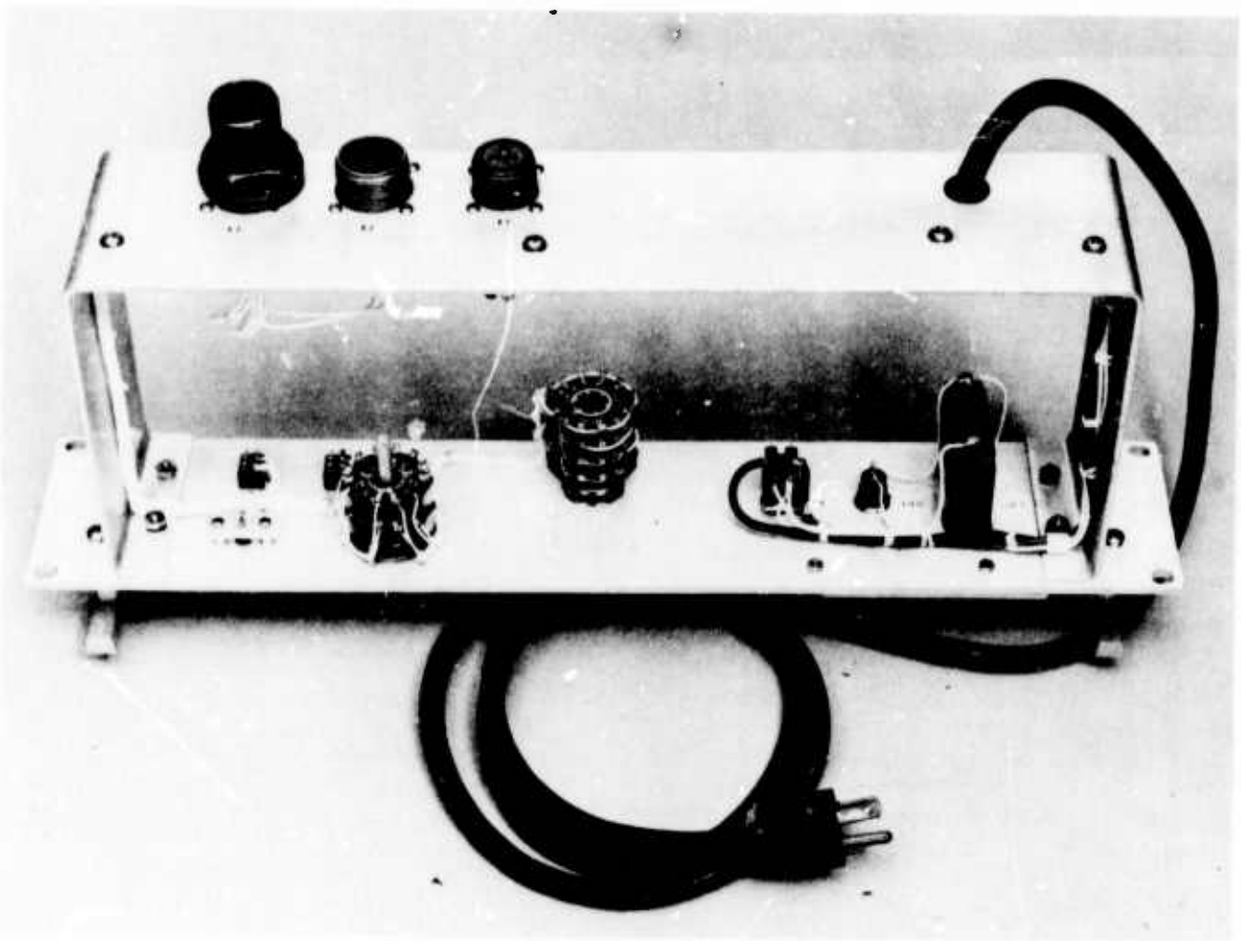


A16 - POWER CONTROL


NOTES:
1. K1 AND K2 BOTTOM VIEW
COLOR BEAD
4 3 2 1
8 7 6 5
CPN 974 1084 010
2 ALL RESISTORS VALUES ARE IN OHMS
REVISIONS
LTR
DESCRIPTION
DATE
APPROVED
P/O A16 P1
+24 VDC
C1 24 UF
K1
CR1 1N4854
Q1 2N2219A
R2 560
R1 560
C2 100 UF
R3 18K
430 MHz PA CONTROL
+5V
P/O A16 P1
+24
+5
TO 430 MHz PA
+24 VDC FOR 1325
K2
C5 24 UF
CR2 1N4854
R4 560
1325 MHz PA CONTROL
R5 560
C3 100 UF
R6 18K
Q2 2N2219A
+24
-20
TO 1325 MHz PA
-001
-20V
C4 24 UF
R7 1K
LOSS OF LOCK FAULT SUMMARY LINE
Q3 2N2907A
R8 180
GND
FAULT
TO PA CONTROL
QTY
ITEM NO
PART OR IDENTIFYING NO
NAME
DESCRIPTION
USE ON
ALTN PREF
DASH NO
PARTS LIST
MATERIAL
FINISH
UNLESS OTHERWISE SPECIFIED
CONTRACT NO
PREP J MUZLEY 11-3-73
CHK
APVD
COLLINS RADIO COMPANY
DALLAS TEX NEWPORT BEACH CALIF CEDAR RAPIDS IA
SCHEMATIC DIAGRAM
A16 POWER CONTROL
PACKET RADIO ENTR
SIZE C
CODE IDENT 13499
DWG NO 627-9641
SCALE
SHEET



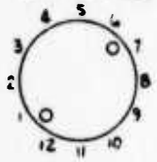
Front Panel



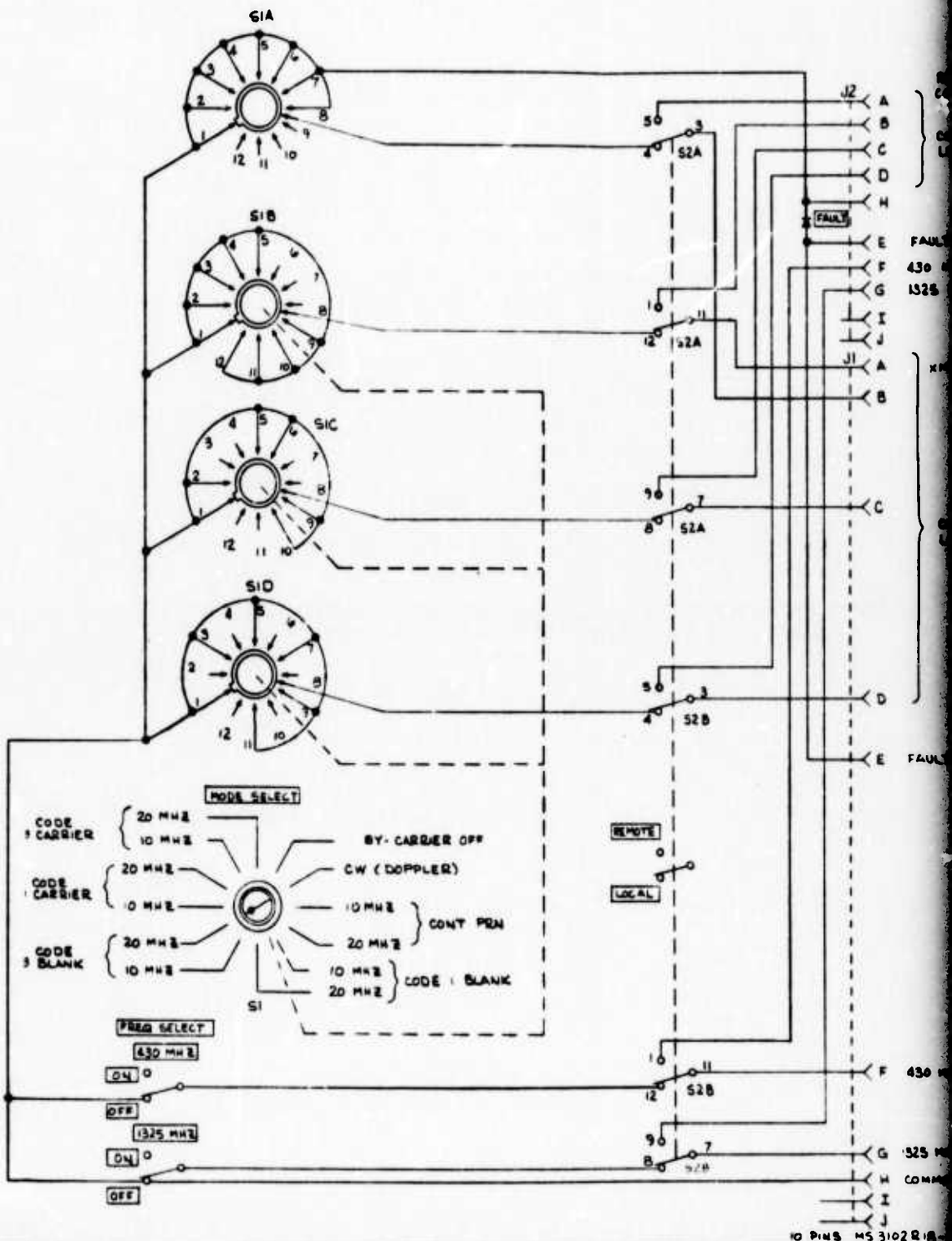
Assembly

NOTES:

1. SWITCH NUMBERING FRONT OF PANEL VIEW



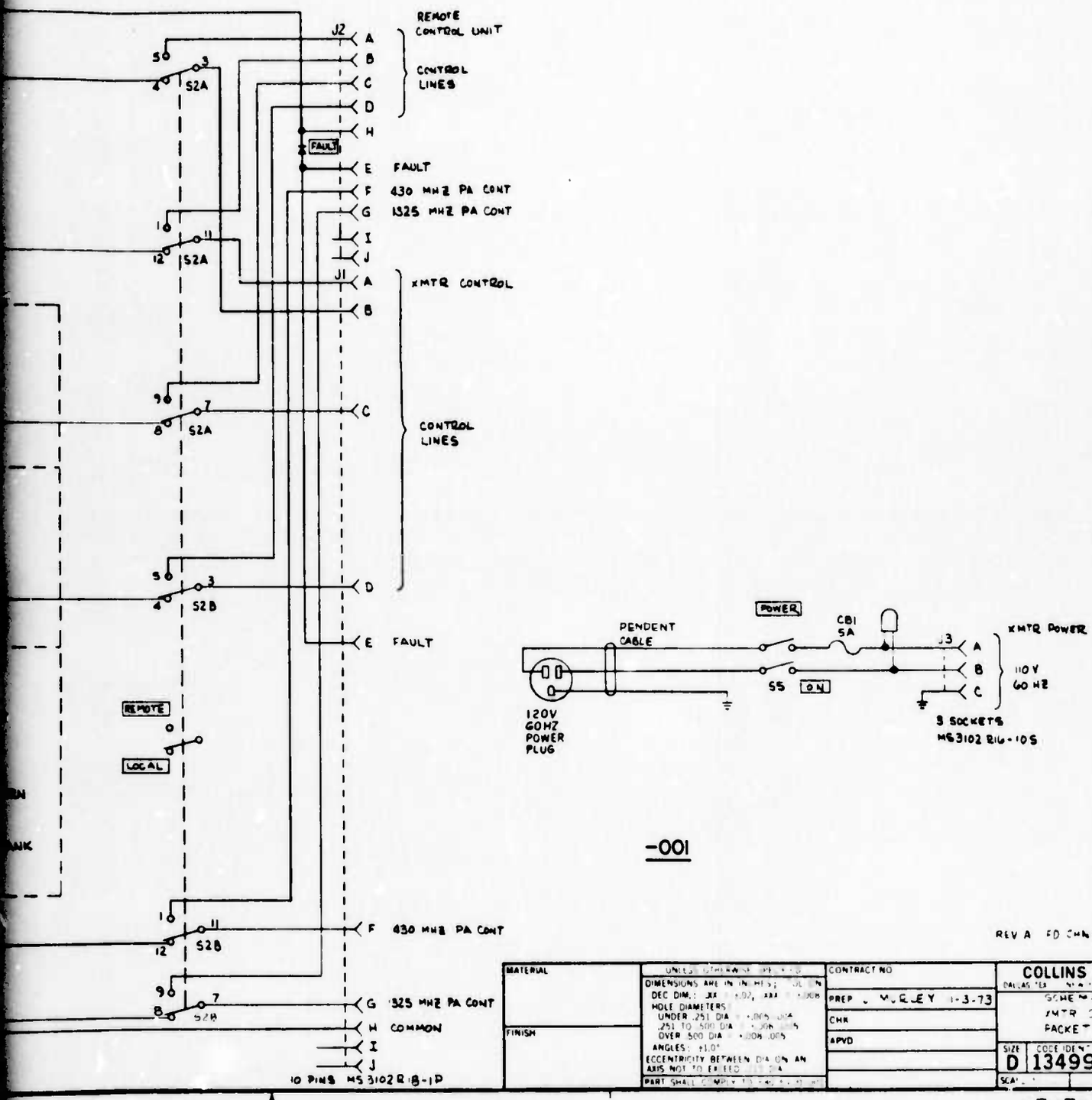
2. NOTES TO MS3102R SERIES CONNECTOR IS MS3106 SERIES



NEXT ASSY TYPE NO.

A

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED



-001

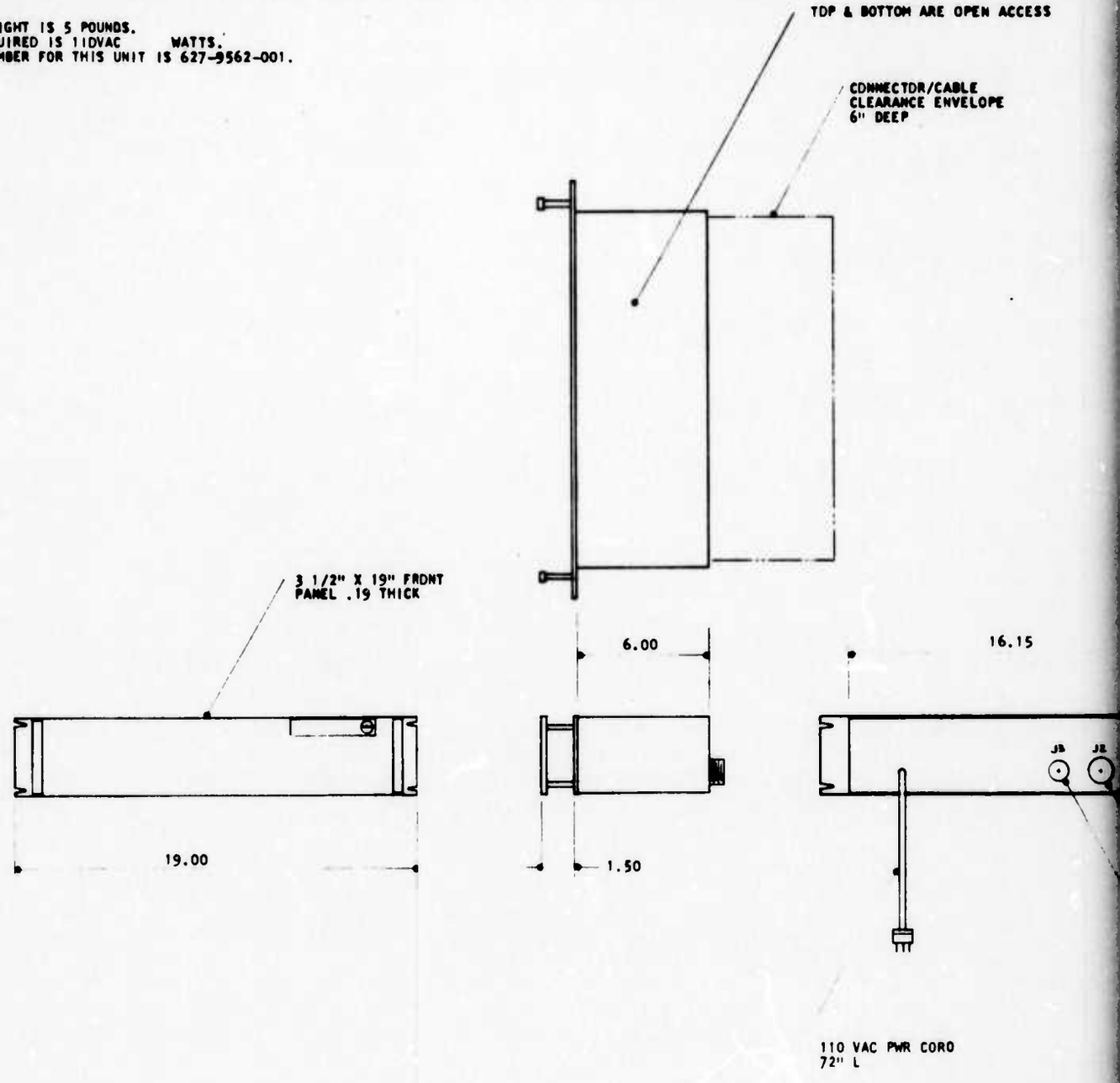
REV A ED CHNG 1-25-74

MATERIAL	UNLESS OTHERWISE SPECIFIED	CONTRACT NO	COLLINS RADIO COMPANY
FINISH	DIMENSIONS ARE IN INCHES; TOLERANCES DEC DIM.: .XX ±.02, .XXX ±.008 HOLE DIAMETERS UNDER .251 DIA +.005 -.004 .251 TO .500 DIA +.008 -.005 OVER .500 DIA +.008 -.005 ANGLES: ±1.0° ECCENTRICITY BETWEEN DIA ON AN AXIS NOT TO EXCEED .010 DIA PART SHALL COMPLY TO SAE AS 478	PREP J. MCGEE 1-3-73	SCHEMATIC DIAGRAM XMTR CONTROL PANEL PACKET RADIO TEST SET
		CHK	
		APVD	
			SIZE D CODE IDENT 13499 DWG NO 627-9587
			SCALE SHEET

B

NOTES:

1. UNIT WEIGHT IS 5 POUNDS.
2. PWR REQUIRED IS 110VAC WATTS.
3. PART NUMBER FOR THIS UNIT IS 627-9562-001.



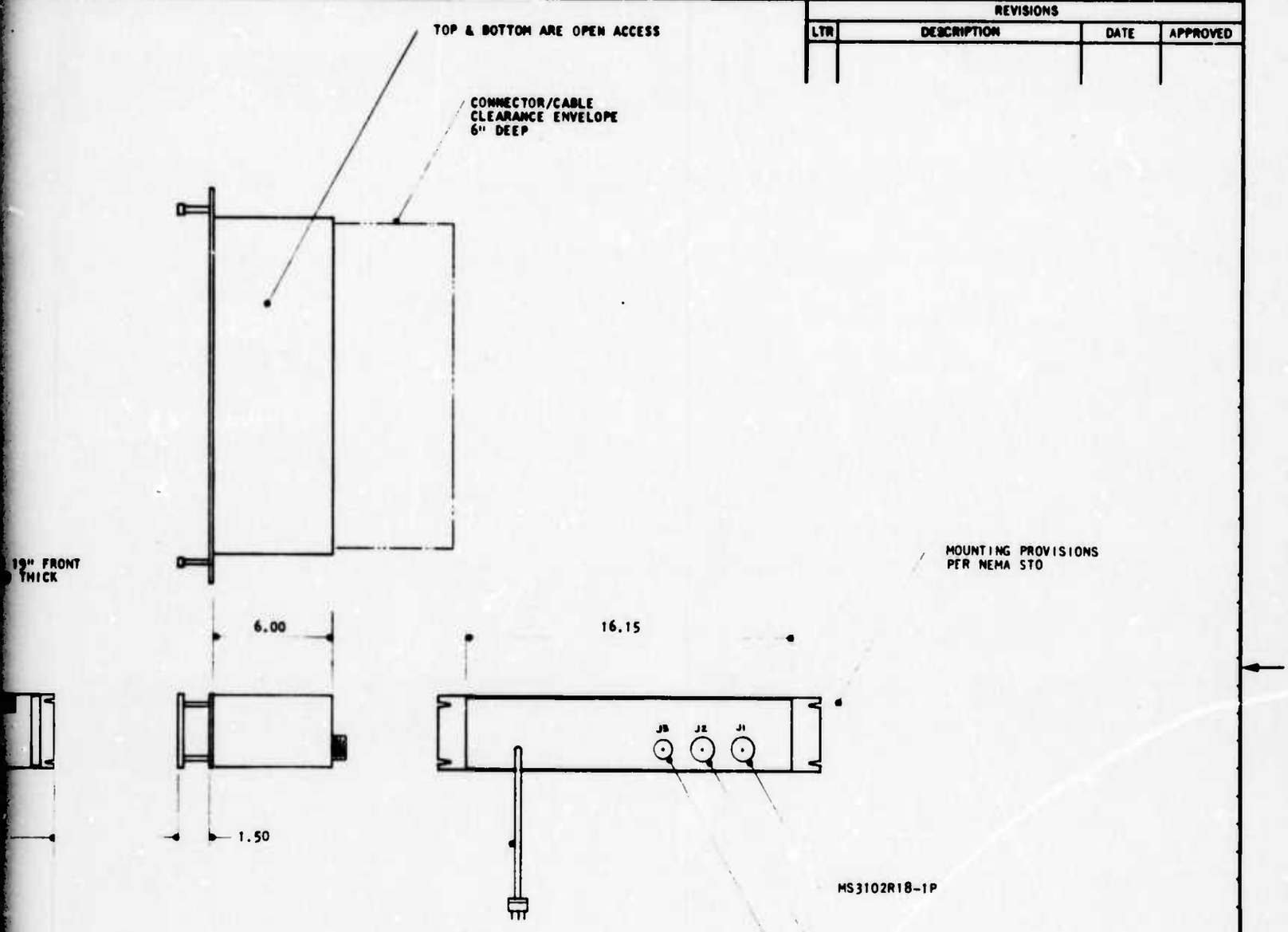
QTY	ITEM NO.	PART OR IDENTIFYING
	OASH NO	

MATERIAL	UNLESS OTHERWISE SPECIFIED	CONTR
N/A	DIMENSIONS ARE IN INCHES; TOL ON DEC DIM.: .XX = ±.02, .XXX = ±.008 HOLE DIAMETERS: UNDER .251 DIA = +.005-.005 .251 TO .500 DIA = +.006-.005 OVER .500 DIA = +.008-.005 ANGLES: ±1.0° ECCENTRICITY BETWEEN DIA ON AN AXIS NOT TO EXCEED .010 DIA	PREP CHK APVD
FINISH		
N/A	PART SHALL COMPLY TO 580-5400-001	

NEXT ASSY: TYPE NO:

A

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED

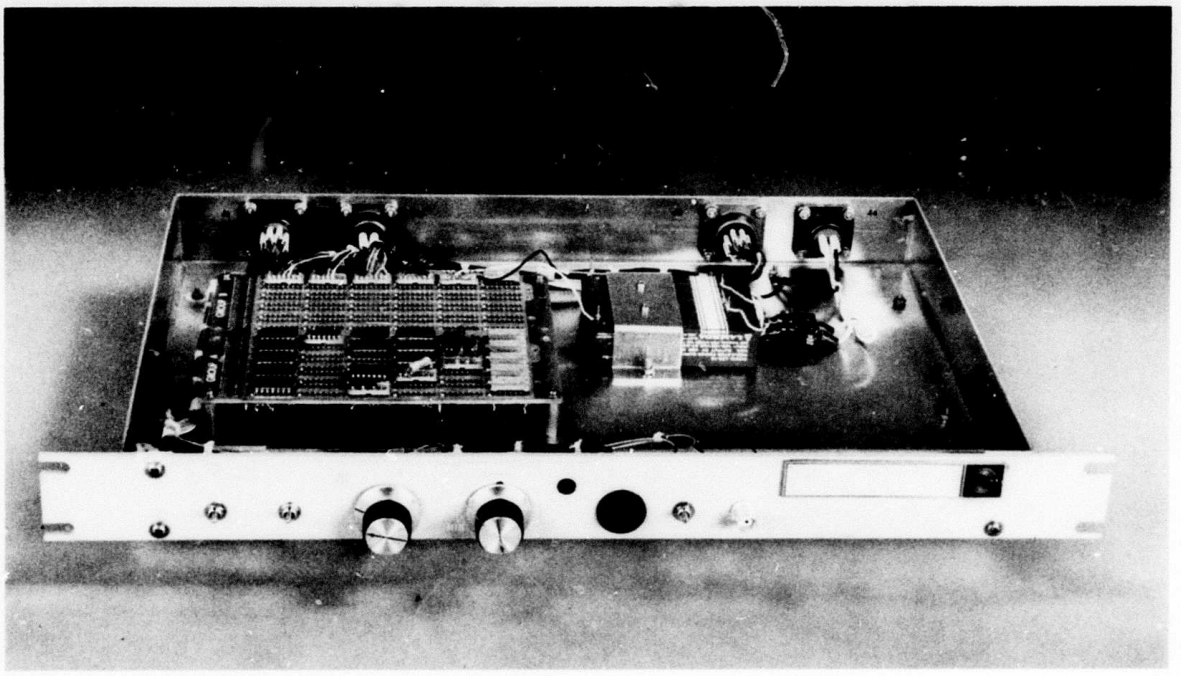


QTY	ITEM NO.	PART OR IDENTIFYING NO	NAME	DESCRIPTION	UM	MN	ALTN PREF
	DASH NO			PARTS LIST			

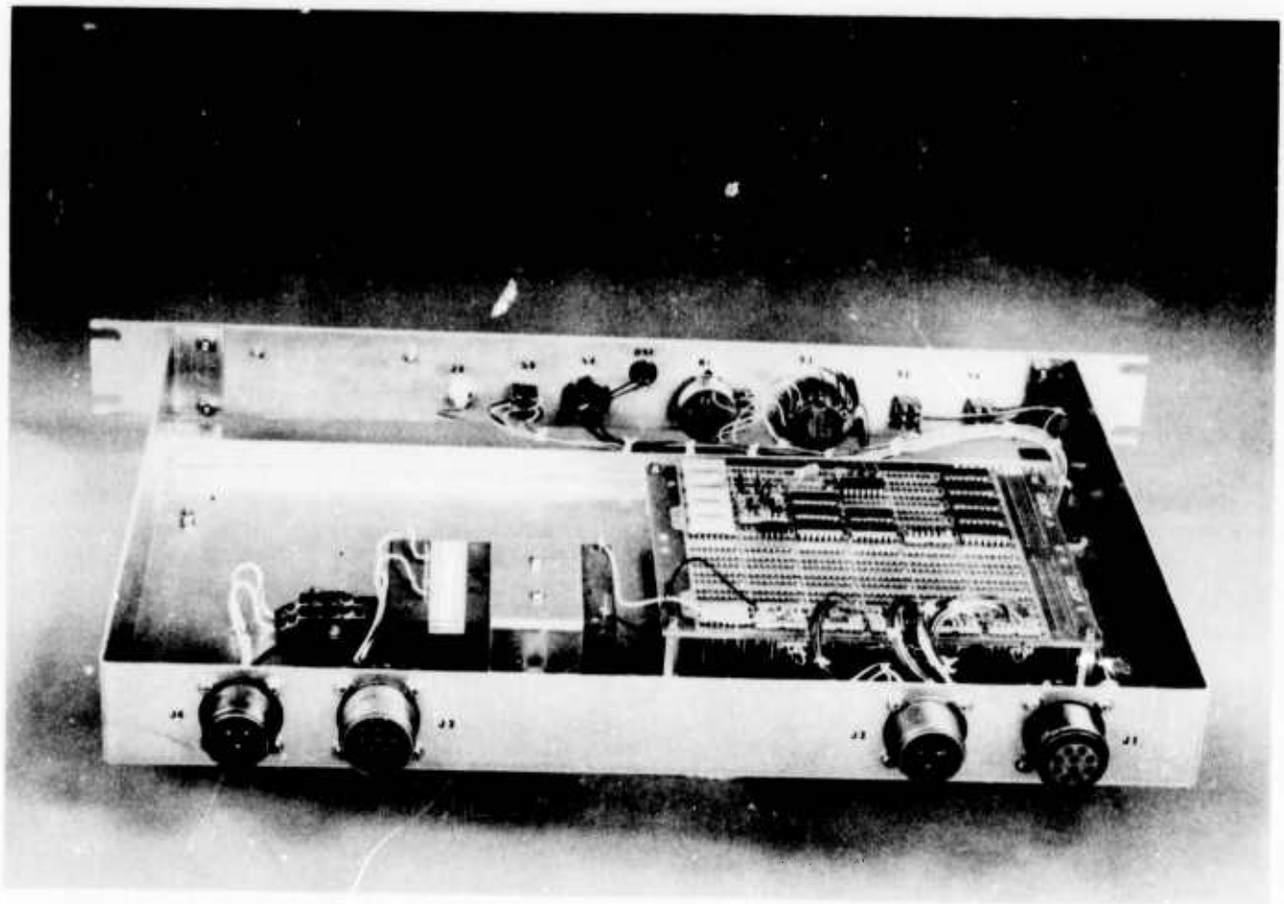
MATERIAL: N/A	UNLESS OTHERWISE SPECIFIED	CONTRACT NO.	COLLINS RADIO COMPANY DALLAS, TEX NEWPORT BEACH, CALIF CEDAR RAPIDS, IA
FINISH: N/A	DIMENSIONS ARE IN INCHES; TOL ON DEC DIM.: .XX = ±.02, .XXX = ±.008 HOLE DIAMETERS: UNDER .251 DIA = +.005-.005 .251 TO .500 DIA = +.006-.005 OVER .500 DIA = +.008-.005 ANGLES: ±1.0° ECCENTRICITY BETWEEN DIA ON AN AXIS NOT TO EXCEED .010 DIA PART SHALL COMPLY TO 580-5400-001	PREP D. DELFELD 11/16/73 CHK APVD R A Newell	TRANSMITTER CONTROL- OUTLINE & INSTALLATION, PACKET RADIO TEST SET SIZE C | CODE IDENT 13499 | DWG NO 627-9571 SCALE 1/4 | SHEET

FRO ☐ NFP ☐ REL ☐ REV__ TC__ CR__ NB__ DL__ TO__

B



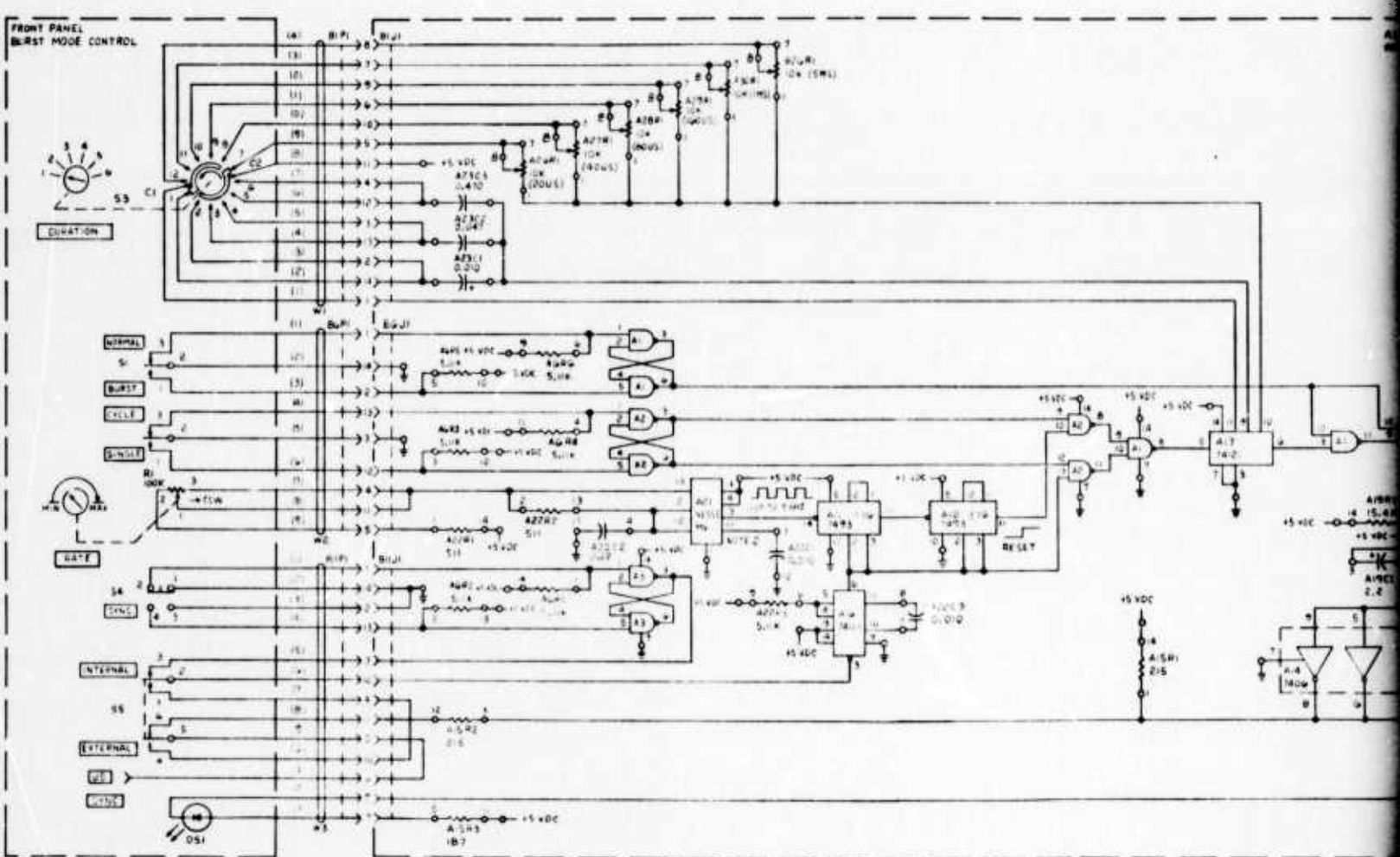
Front Panel



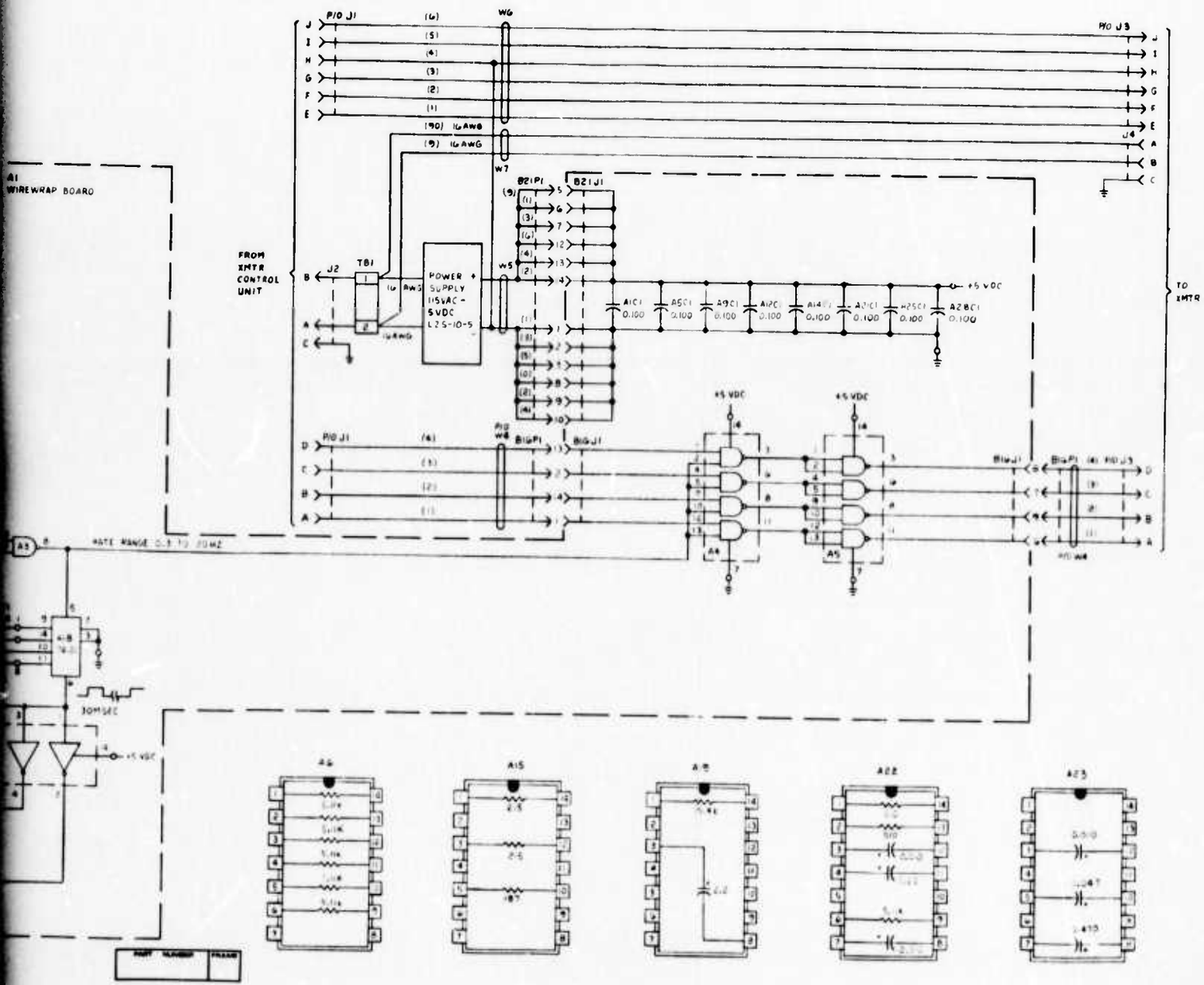
Assembly

NOTES:

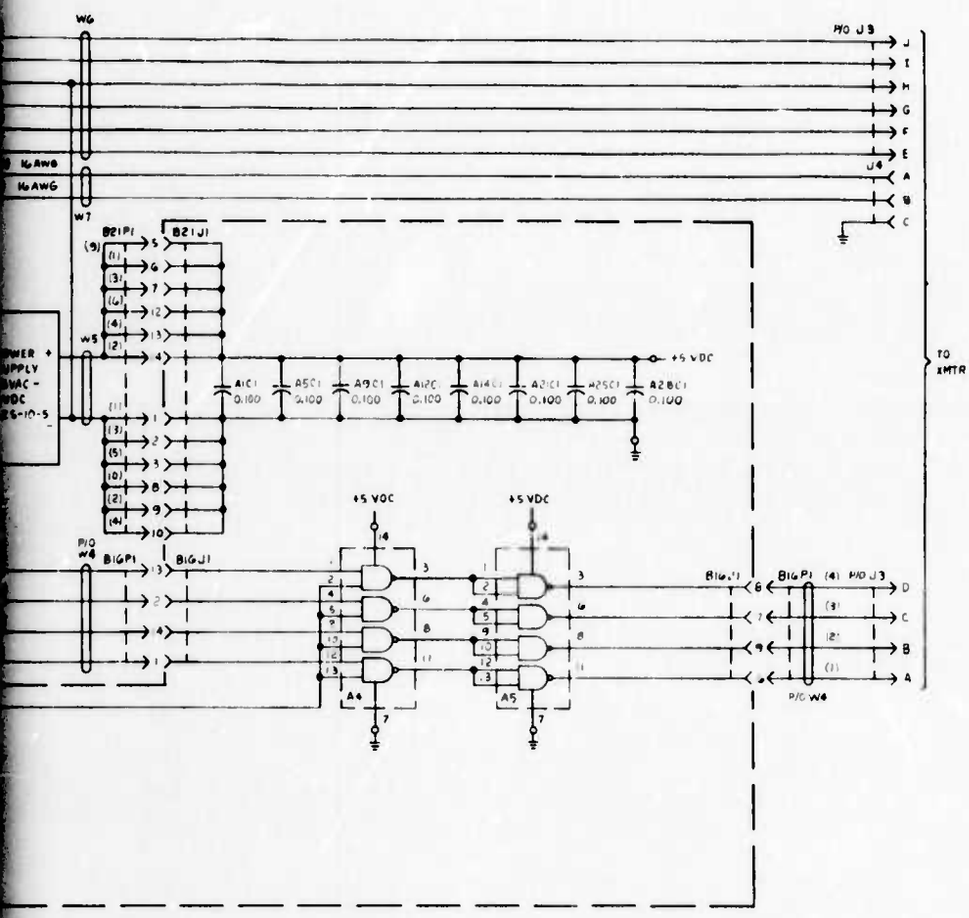
1. UNLESS OTHERWISE SPECIFIED
   ALL RESSISTANCE VALUES ARE IN OHMS
   ALL CAPACITANCE VALUES ARE IN MICROFARADS
   ALL WIRE #22 TEFLON, WITH COLOR CODE IN ( )
2. THE 555 TIMER IS MOUNTED AT POSITION A2I WITH PIN 1 OF THE COMPONENTS MATING WITH PIN 1 OF THE BOARD.
3. ALL AUDIO CONNECTIONS FROM BOARD A1 ARE LOCATED IN SECTION B.
4. CIRCUIT CARD GND FLOATING WITH RESPECT TO CHASSIS GND.

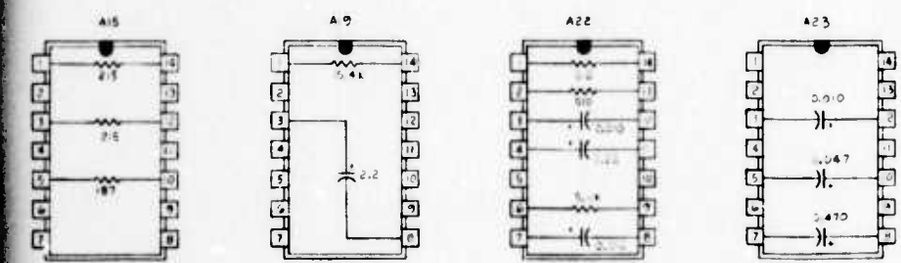


A


A1
WIREWRAP BOARD
FROM
XMTR
CONTROL
UNIT
TO
XMTR
P10 J1
P10 J3
J4
W6
W7
W5
W4
TB1
J2
16 AWG
POWER
SUPPLY
115VAC-
5VDC
LZS-10-5
+5 VDC
A1C1
A5C1
A9C1
A12C1
A14C1
A21C1
A25C1
A28C1
0.100
B21P1
B21J1
B16P1
B16J1
A5
A4
A6
A15
A16
A22
A23

B





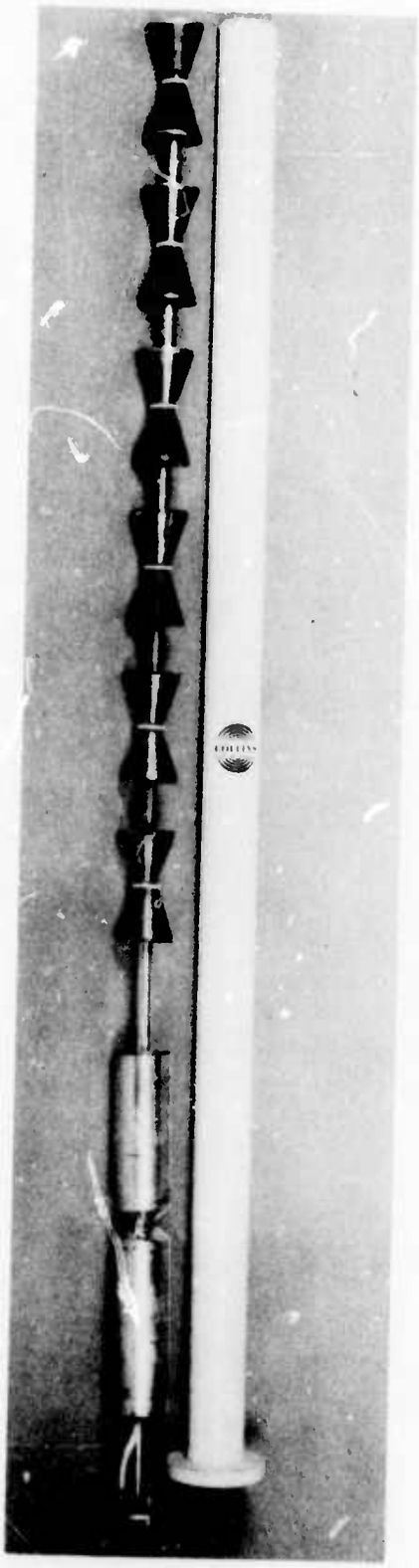
REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED

PUBLICATIONS DRAWING

CONTRACT NO	COLLINS RADIO COMPANY
PREP	
CHK	
APVD	
SIZE D	CODE IDENT 13499
SCALE	SHEET

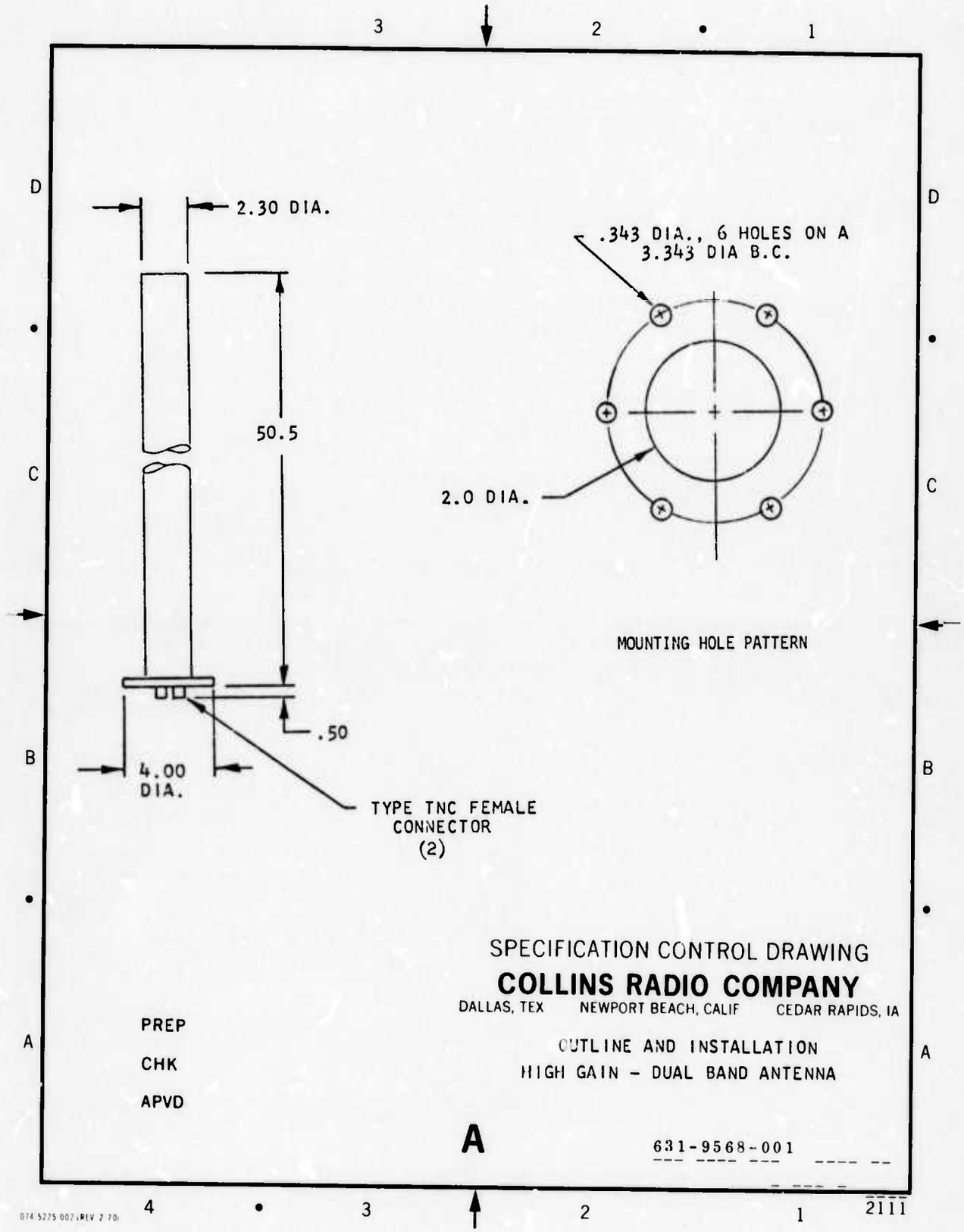
DWG NO 13-4554-001

C



Assembly View

Assembly View


2.30 DIA.
50.5
.50
4.00
DIA.
TYPE TNC FEMALE
CONNECTOR
(2)
.343 DIA., 6 HOLES ON A
3.343 DIA B.C.
2.0 DIA.
MOUNTING HOLE PATTERN
SPECIFICATION CONTROL DRAWING
COLLINS RADIO COMPANY
DALLAS, TEX NEWPORT BEACH, CALIF CEDAR RAPIDS, IA
PREP
CHK
APVD
OUTLINE AND INSTALLATION
HIGH GAIN - DUAL BAND ANTENNA
A
631-9568-001
074 5225 002 (REV 2 70)
2111

B.1 INTRODUCTION

Although the test set has been designed to allow the user to adjust many levels for specific tests, two alignment procedures are suggested.

a. IF channel gain and receiver signal meter calibration

b. Doppler test setup

The if. channel gain adjustments normalize all signals (430 MHz RCV, 1370 MHz RCV, wideband or narrowband) to a constant level for monitoring or processing.

The front panel receive signal strength meter operates on the agc voltage and is only usable when in the automatic agc mode. It provides a gross signal strength indication to the operator.

Doppler tests may be made in open loop or phase-lock mode. The frequency standards in the receiver and transmitter have sufficiently low drift rate to allow short period measurements, provided the oscillators are carefully adjusted for synchronism. A very long loop time constant (minutes) is employed to avoid tracking the low rate doppler expected in tests in an urban environment.

The adjustment procedures reference 1325 MHz which is engraved on the front panel. The test set has been converted to 1370 MHz and the procedures are still valid.

B.2 ADJUSTMENT PROCEDURE OF IF CHANNEL GAIN AND RCVR SIG METER CALIBRATION

a. Terminate (50 ohms) both antenna input ports.

b. Set both if. channel gain controls for max gain (full CW)

c. Select

Channel	430 MHz
BW	WB
IF agc	Auto
Threshold Det	IF
Doppler Test	Disable

d. Adjust automatic agc gain level for desired output (put on top of A1)

e. Adjust the offset control (top of A1 out house) for a reading of 0.2 mA on the RCVR SIG meter.

f. Select the 1325 channel. Note the RCVR SIG meter reading.

g. Adjust the channel with the highest MA reading on the RCVR SIG meter to be equal to the other channel.

h. Select the NB mode and adjust the NB gain control (located toward the front of module A3A1) for a RCVR SIG meter reading equal to that obtained in step g.

i. Readjust the offset control on the top of A1 for a reading of 0 mA on the RCVR SIG meter.

j. Recheck the balance of the NB/WB/430/1325 switch positions.

k. Apply a 430 or 1325 MHz CW signal at -30 dBm to the appropriate antenna port.

l. Adjust the RCVR SIG meter drive control (located on a bracket behind the meter) for a reading of 1.0 mA.

m. Reterminate the antenna port and readjust the offset control for 0 mA (if required).

n. Repeat steps j., k., and l. until steps k. and l. are correct without readjustment.

o. Generate a meter calibration curve.

B.3 DOPPLER TEST SETUP

The phase lock loop to synchronize the receiver to the transmitter is designed to have a very long time constant so that it will not track the doppler shifts at the low doppler rates expected during the tests. The frequency standard also has sufficient stability to allow short-period doppler measurements to be made open loop, provided the frequency is precisely adjusted just prior to the test. Adjustment of the receiver frequency standard to proper phase lock condition is somewhat tedious due to the long time constant. The following procedure is recommended to reduce the time required for this adjustment.

a. Adjustments for transmitter mode and receiver modes follow:

1.	Transmitter Mode	CW
2.	Receiver Modes	
	Channel Select	430 MHz or 1325 MHz
	BW	NB
	Doppler Test	Disable
	IF AGC AMPL	Auto
	Adjustment	Set 10 MHz FREQ CTL for zero beat frequency as observed on the I&Q meters. This frequency control does not have the doppler time constant delays and zero beat can be obtained in a short period of trial & error adjustment. The I meter should be at zero and the Q meter at -5 volts. The frequency

standard correction voltage can be recorded (to the nearest millivolt) from the front panel test point located below the I&Q meters to minimize alignment in the doppler test mode.

b. If doppler tests are to be made with the receiver locked to the transmitter through the slow loop, proceed to adjust the system as follows:

In the doppler test mode, use the same receiver switch modes as step a. except the doppler test is "ON". Place the ØLL switch to fast. (The loop time constant is still relatively slow in the fast position.) Adjust the 10 MHz Ø CTL until the frequency standard correction voltage is the same as that determined in step a.

Allow 30 seconds or more for the doppler test unit to settle to the vicinity of null. Fine adjust the phase control for the I meter to be 0 and the Q meter to be -5V.

Set the ØLL T_c switch to slow and slowly readjust the phase control for the proper I&Q meter readings if necessary.

Note: If in the field with doppler affects being displayed, the I&Q meters will never stabilize at the 0 volts and -5-volt positions.

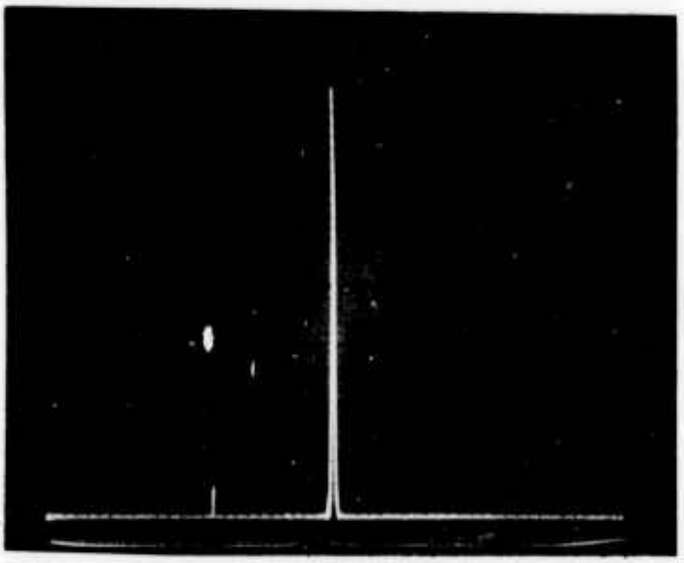
C.1 INTRODUCTION

The data in this appendix is presented without narrative and is considered self-explanatory. The index defines the order of presentation for quick reference. Note that the data reflects the performance at 1325 MHz and was not repeated at 1370 MHz. The performance at 1370 MHz is the same as the data presented for 1325 MHz.

Transmitter Spectrums

1325 MHz

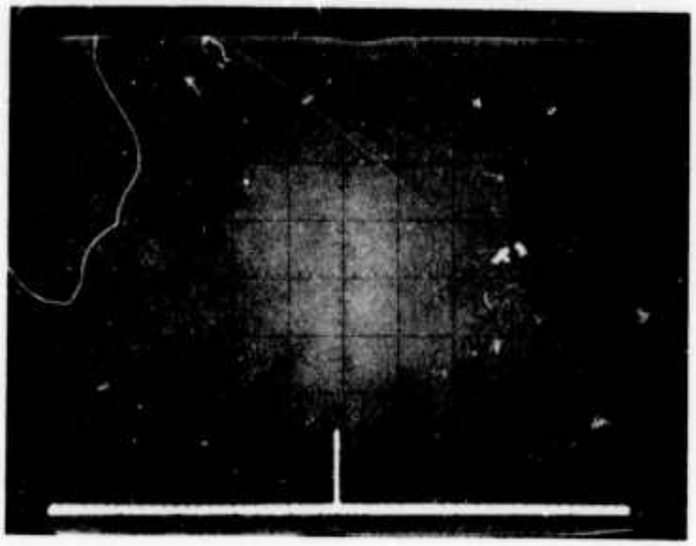
Mode CW



XMTR
30 DB
SPECTRUM
ANALYZER

LOG REF	+10 DBM
BW	300 KHZ
FC	1325 MHZ
SCAN	20 MHZ/DIV

Standby Mode



XMTR
30 DB
SPECTRUM
ANALYZER

LOG REF	+10 DBM
BW	300 KHZ
FC	1325 MHZ
SCAN	20 MHZ/DIV

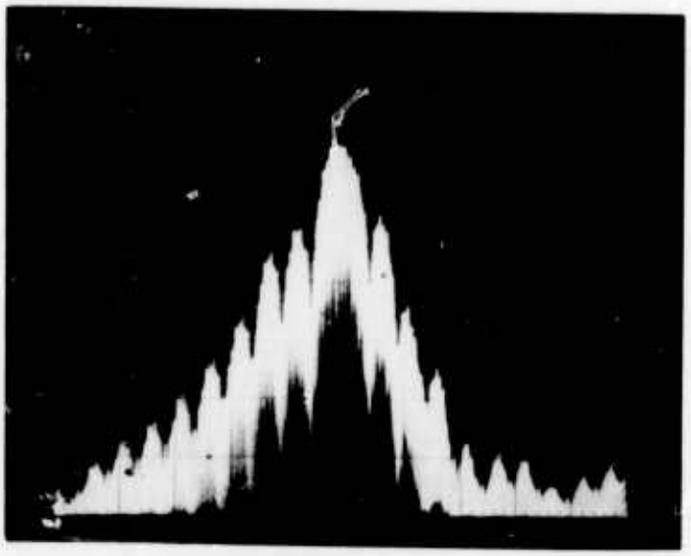
NOTE

With PA power off, signal is <-80 dBm.

Transmitter Spectrums (Cont)

1325 MHz

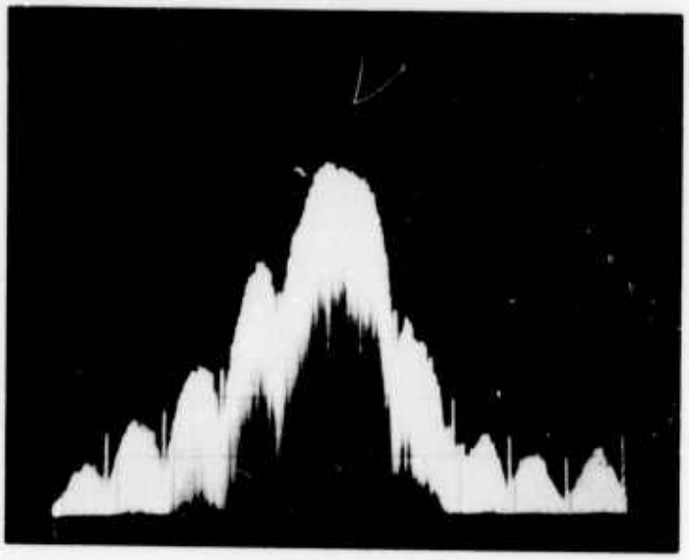
10 M-Chip Continuous Code Mode



XMTR
30 DB
SPECTRUM
ANALYZER

LOG REF	+10 DBM
BW	300 KHZ
FC	1325 MHZ (APPROX)
SCAN	20 MHZ/DIV

20 M-Chip Continuous Code Mode



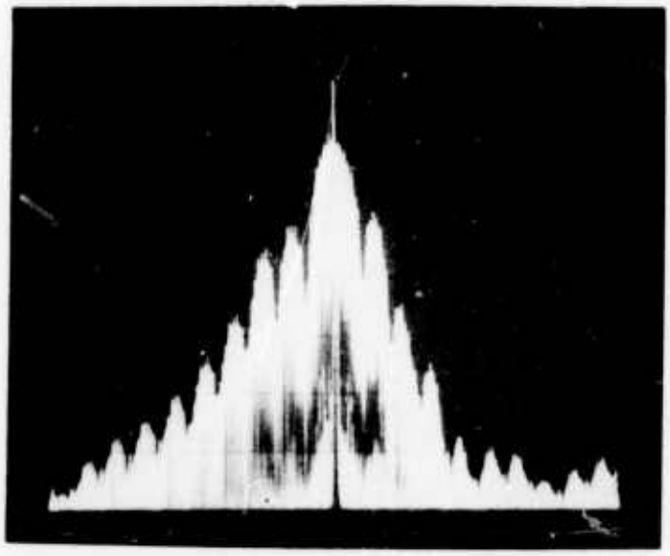
XMTR
30 DB
SPECTRUM
ANALYZER

LOG REF	+10 DBM
BW	300 KHZ
FC	1325 MHZ (APPROX)
SCAN	20 MHZ/DIV

Transmitter Spectrums (Cont)

1325 MHz

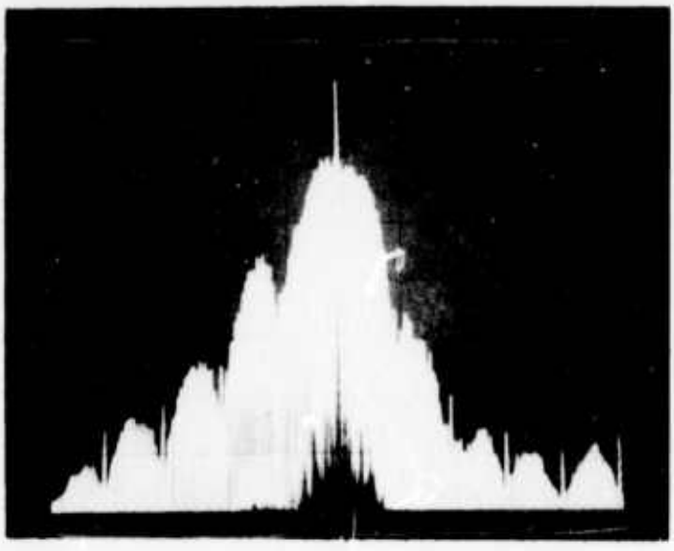
10 M-Chip Rate 1 Code/1 Carrier Mode



XMTR
30 DB
SPECTRUM
ANALYZER

LOG REF	+10 DBM
BW	300 KHZ
FC	1325 MHZ
SCAN	20 MHZ/DIV

20 M-Chip Rate 1 Code/1 Carrier



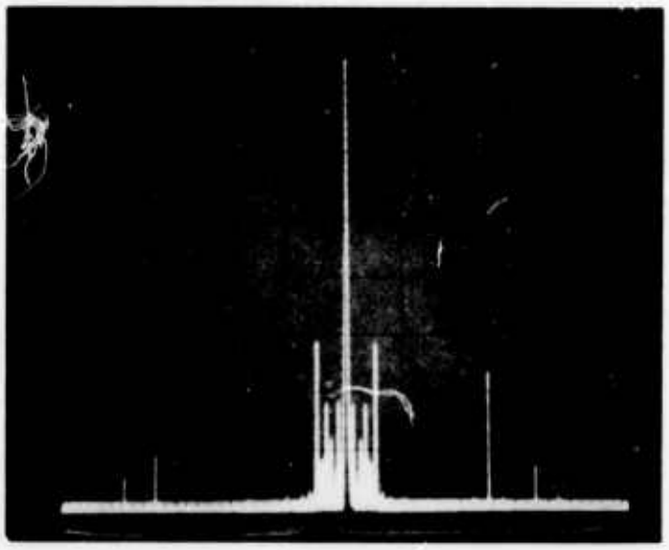
XMTR
30 DB
SPECTRUM
ANALYZER

LOG REF	+10 DBM
BW	300 KHZ
FC	1325 MHZ
SCAN	20 MHZ/DIV

Transmitter Spectrums

430 MHz

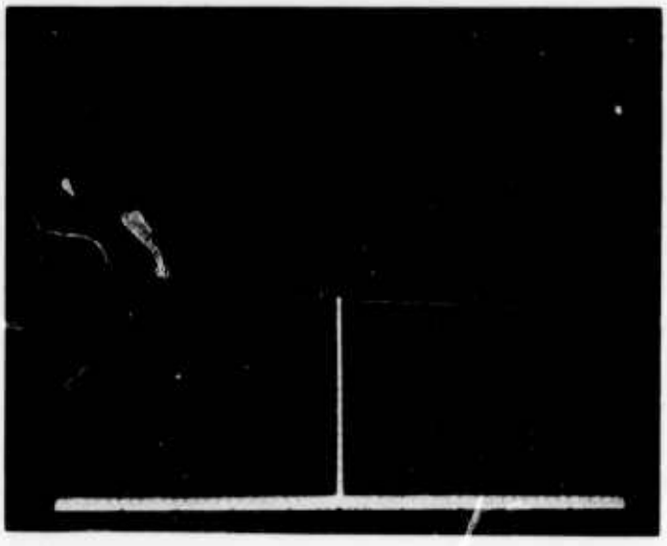
CW Mode



XMTR
40 DB
SPECTRUM
ANALYZER

LOG REF	+10 DBM
BW	300 KHZ
FC	430 MHZ
SCAN	20 MHZ/DIV

Standby Mode



XMTR
40 DB
SPECTRUM
ANALYZER

LOG REF	+10 DBM
BW	300 KHZ
FC	430 MHZ
SCAN	20 MHZ/DIV

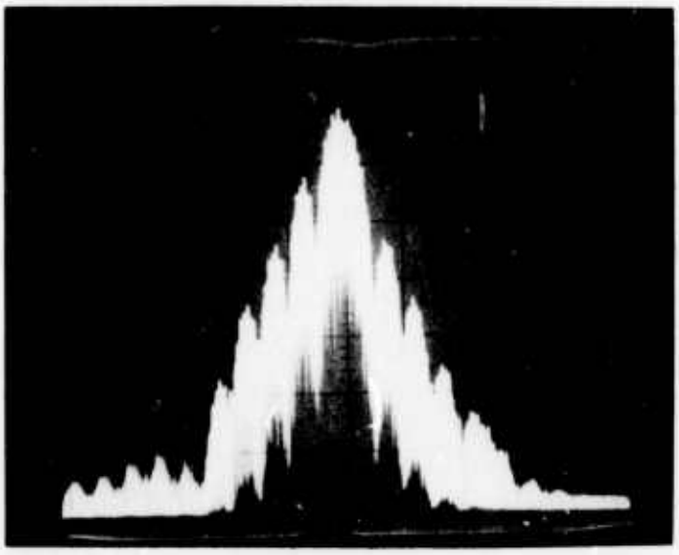
NOTE

With PA power off, signal is <-80 dBm.

Transmitter Spectrums (Cont)

430 MHz

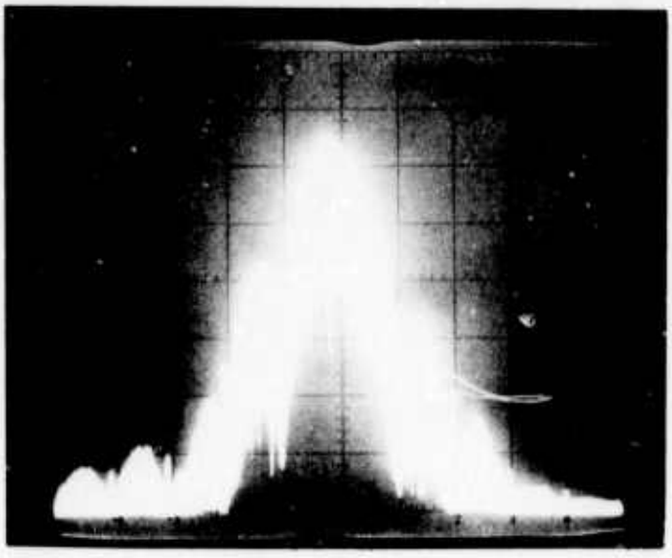
10 M-Chip Rate Continuous Code



XMTR
40 DB
SPECTRUM ANALYZER

LOG REF	+10 DBM
BW	300 KHZ
FC	430 MHZ
SCAN	20 MHZ/DIV

20 M-Chip Rate Continuous Code



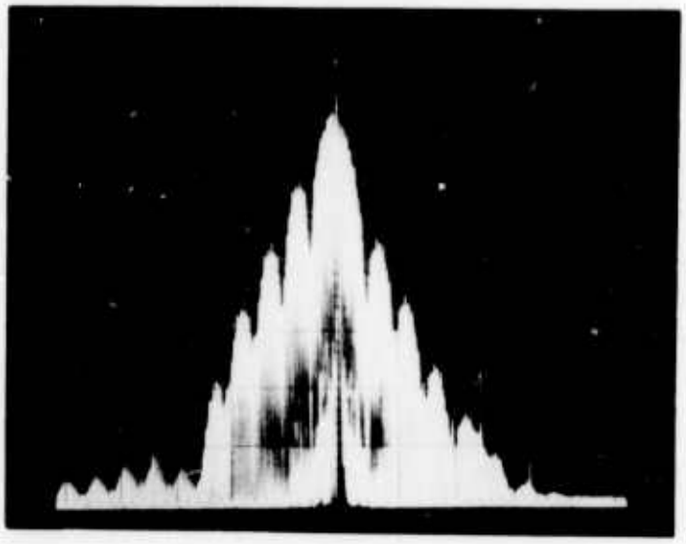
XMTR
40 DB
SPECTRUM ANALYZER

LOG REF	+10 DBM
BW	300 KHZ
FC	430 KHZ
SCAN	20 MHZ/DIV

Transmitter Spectrums (Cont)

430 MHz

10 M-Chip Rate 1 Code/1 Carrier

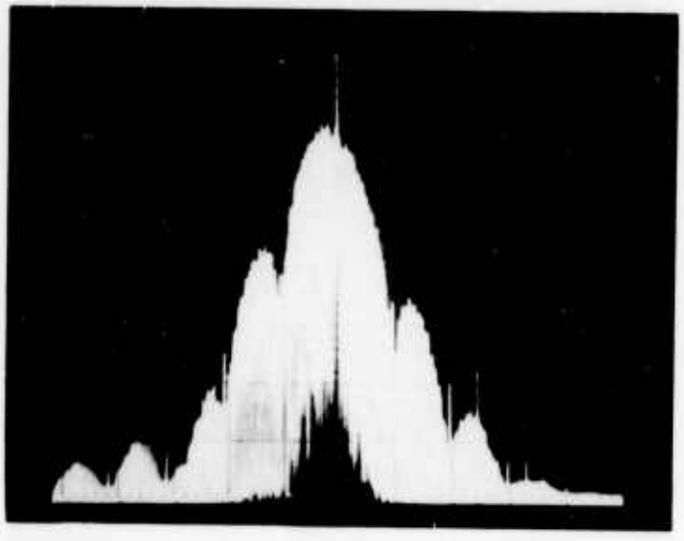


XMTR

SPECTRUM
ANALYZER

LOG REF	+10 DBM
BW	300 KHZ
FC	430 MHZ
SCAN	20 MHZ/DIV

20 M-Chip Rate 1 Code/1 Carrier



XMTR

SPECTRUM
ANALYZER

LOG REF	+10 DBM
BW	300 KHZ
FC	430 MHZ
SCAN	20 MHZ/DIV

Received Signals

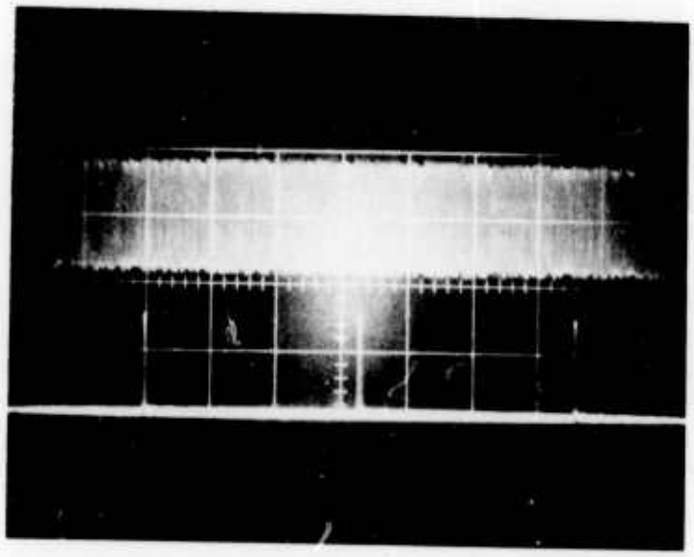
The following apply for this series of pictures:

- Top Trace - rf if. measured at threshold detector output (0.5V/cm)
- Bottom Trace - envelope detector output (1.0V/cm)

(Measurements taken on Tektronix's 585A.)

- Horizontal Scale 4 μs/cm
- Transmitter rf attn'd & connected to receiver
- AGC in manual gain.

10 M-Chip Rate



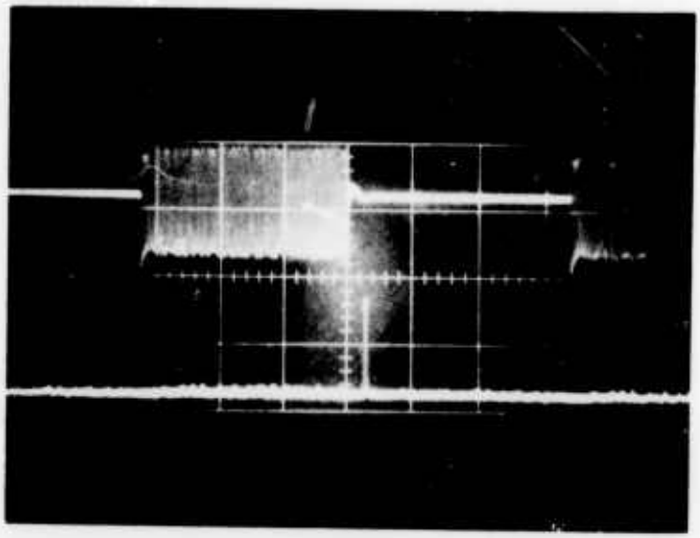
CONTINUOUS PRN CODE

IF
0.5 V/CM (VERT)

DET
1.0 V/CM (VERT)

Receive Signals

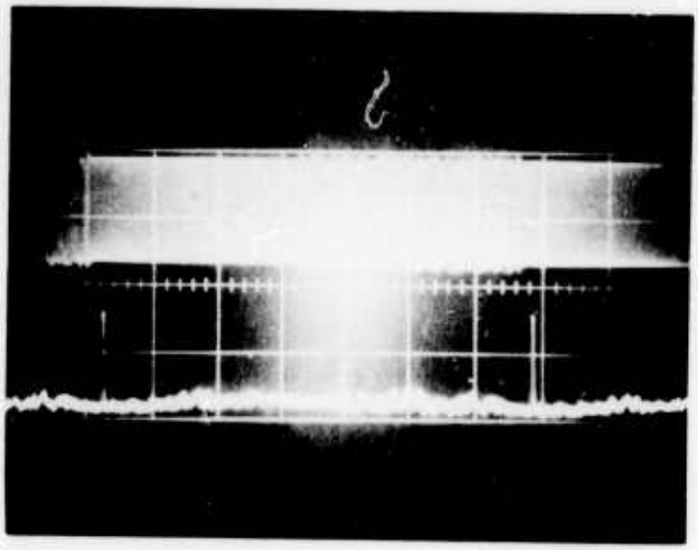
10 M-Chip Rate (Cont)



1 CODE - 1 BLANK

IF

DET



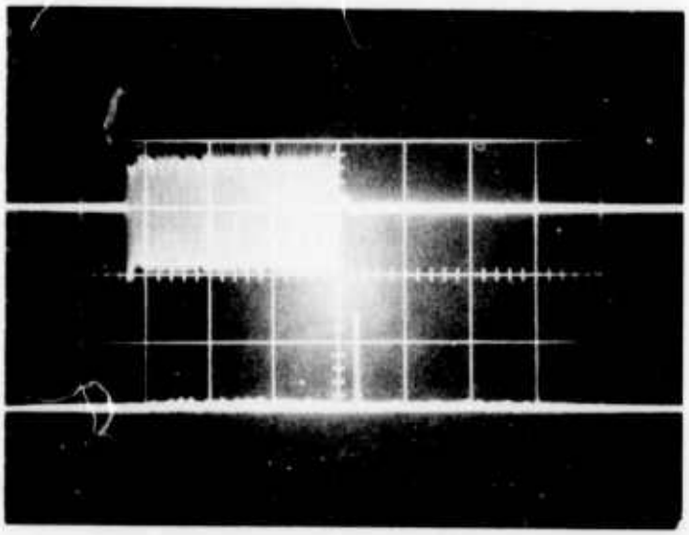
1 CODE - 1 CARRIER

IF

DET

Receive Signals

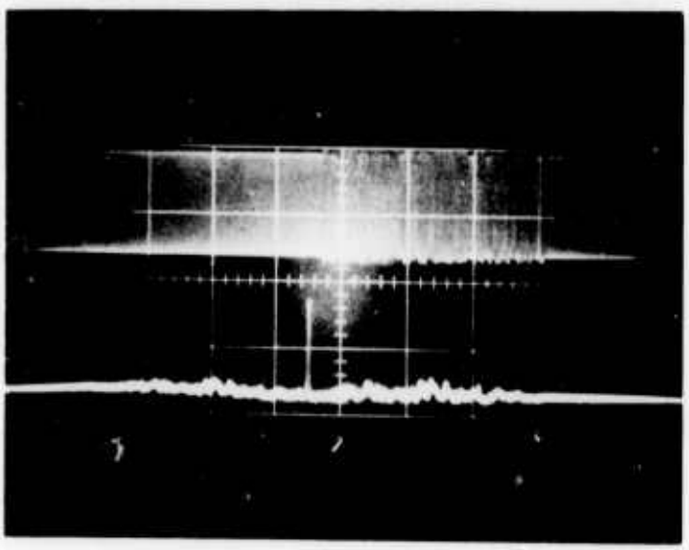
10 M-Chip (Cont)



1 CODE - 3 BLANK

IF

DET



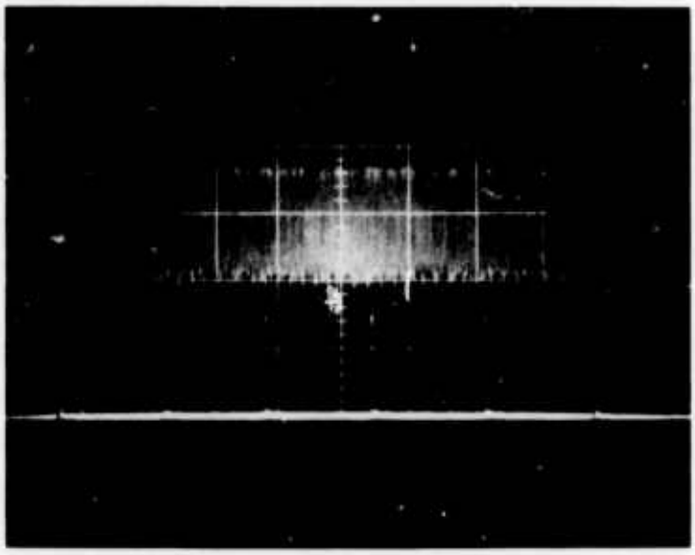
1 CODE - 3 CARRIER

IF

DET

Receive Signals

20 M-Chip



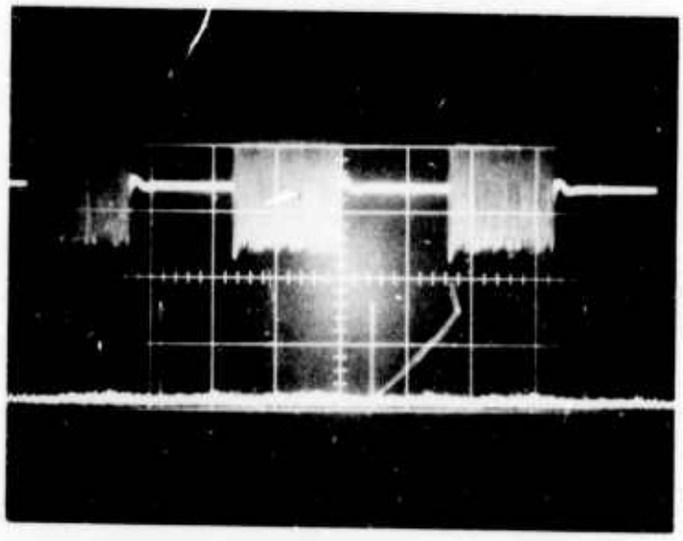
CONTINUOUS CODE

IF

DET

Receive Signals

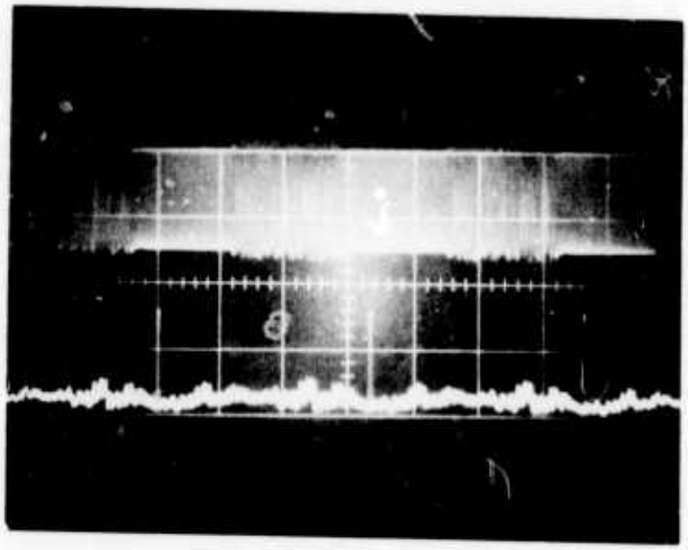
20 M-Chip (Cont)



1 CODE - 1 BLANK

IF

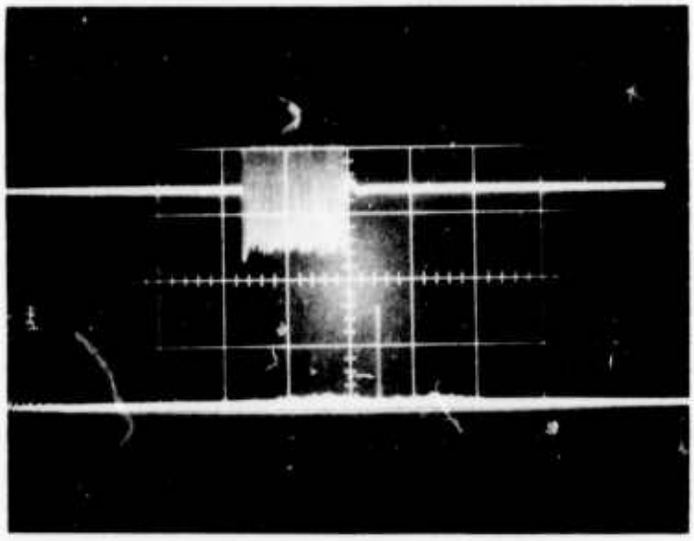
DET



1 CODE - 1 CARRIER

IF

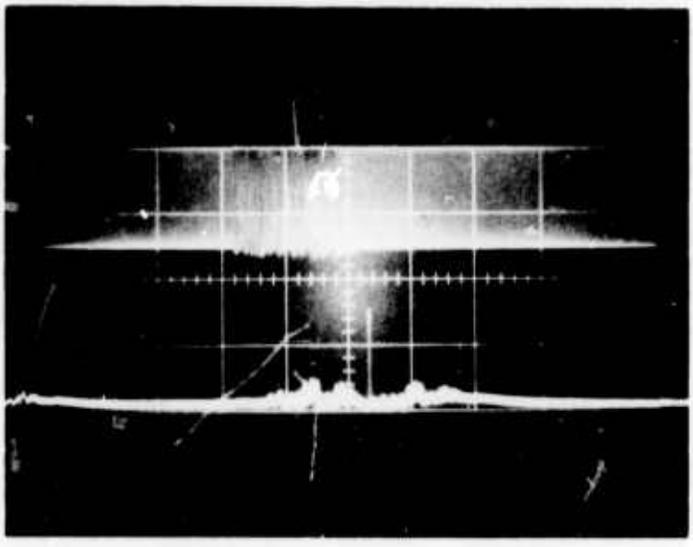
DET



1 CODE - 3 BLANK

IF

DET

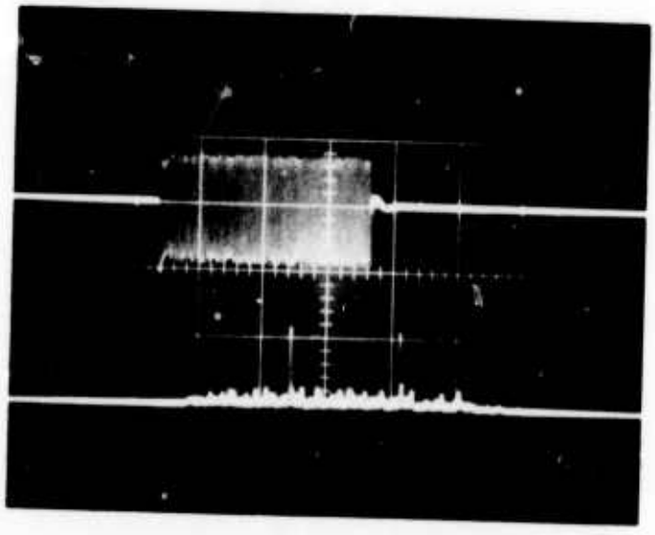


1 CODE - 3 CARRIER

IF

DET

Interaction of SAWD's and Code Rate



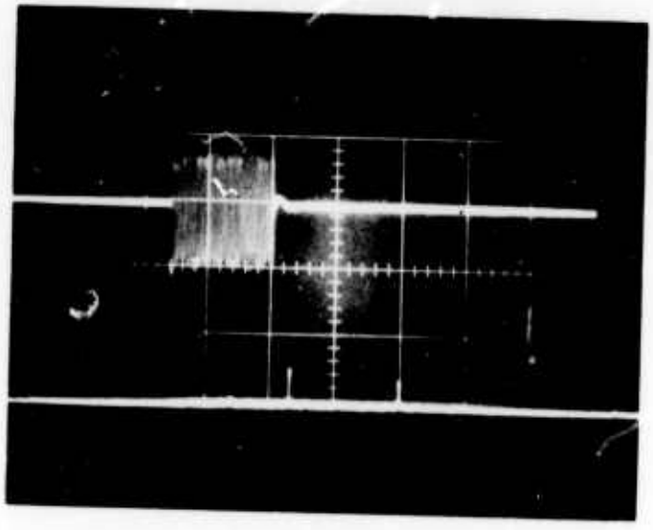
XMTR
10 M CHIP, 1 CODE - 3 BLANK

RCVR
20 M CHIP SAWD RCV

TOP TRACE
RCV IF 0.5 V/CM

BOTTOM TRACE 1.0 V/CM

TIME BASE 4 μS/CM



XMTR
20 M CHIP, 1 CODE - 3 BLANK

RCVR
10 M CHIP SAWD RCV

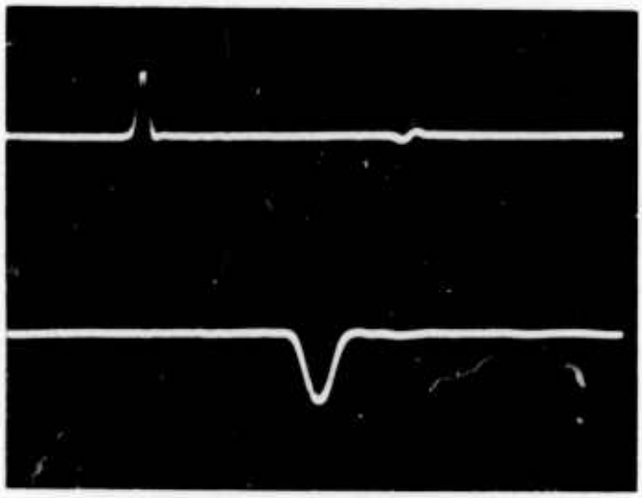
TOP TRACE
RCV IF 0.5 V/CM

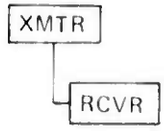
BOTTOM TRACE 1.0 V/CM

TIME BASE 4 μS/CM

Miscellaneous Radio Data

Envelope Detector Response

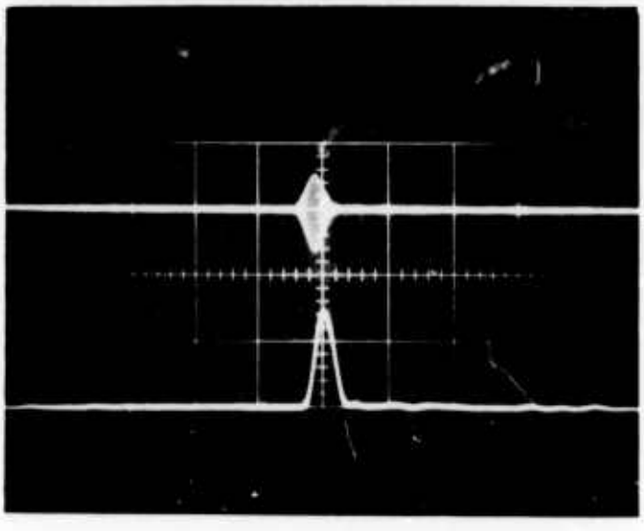


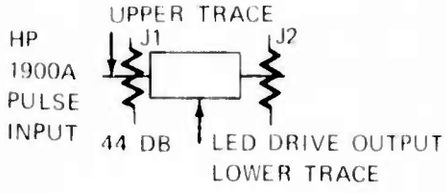


10 M CHIP 1 CODE 3 BLANK
TOP TRACE SAWD OUTPUT
0.5 V/CM (AT THRESHOLD DET OUTPUT)
BOTTOM TRACE ENVELOP DET OUTPUT 1.0 V/CM

TIME BASE 4 μS/CM

Threshold Detector Impulse Response

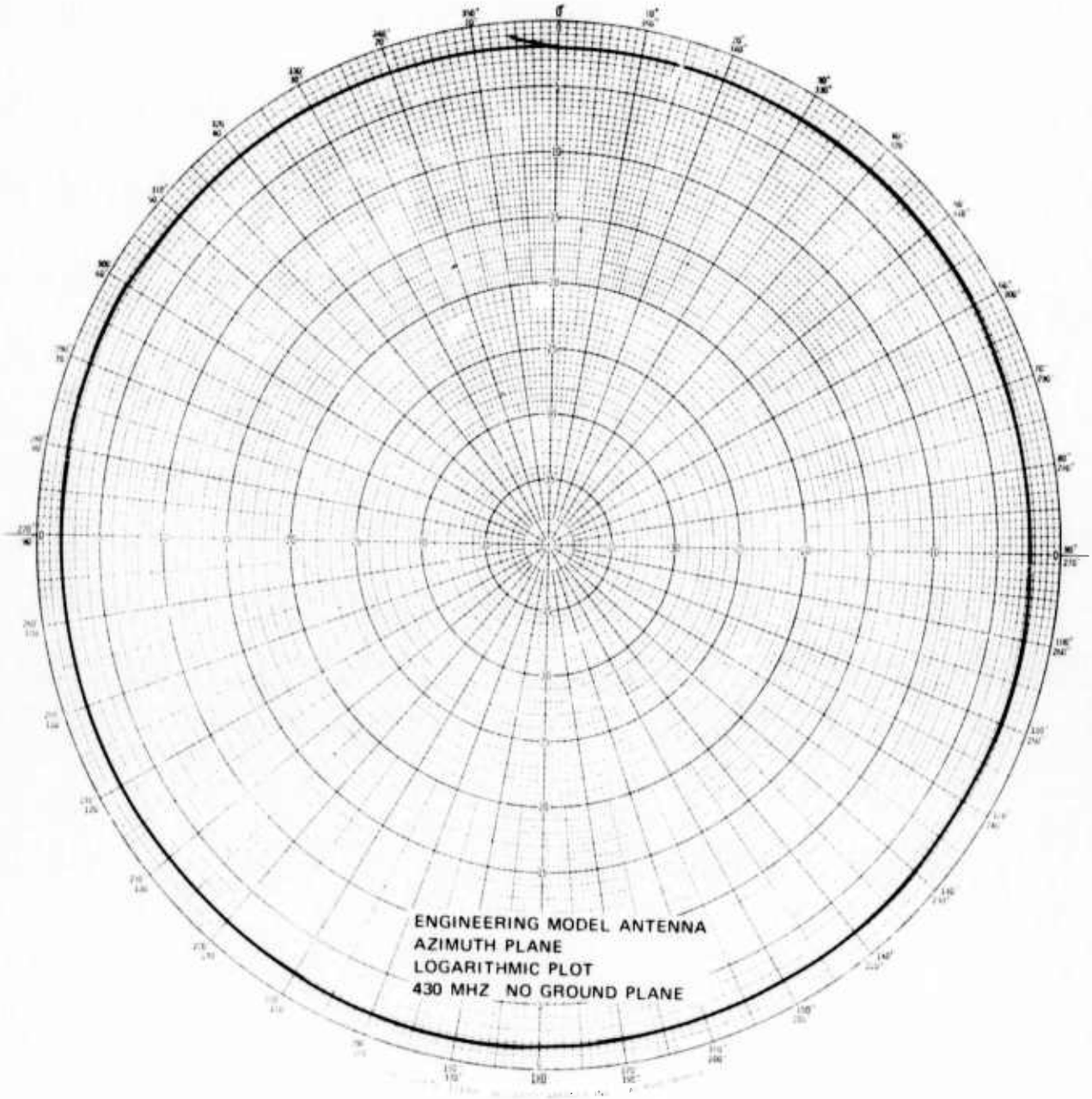


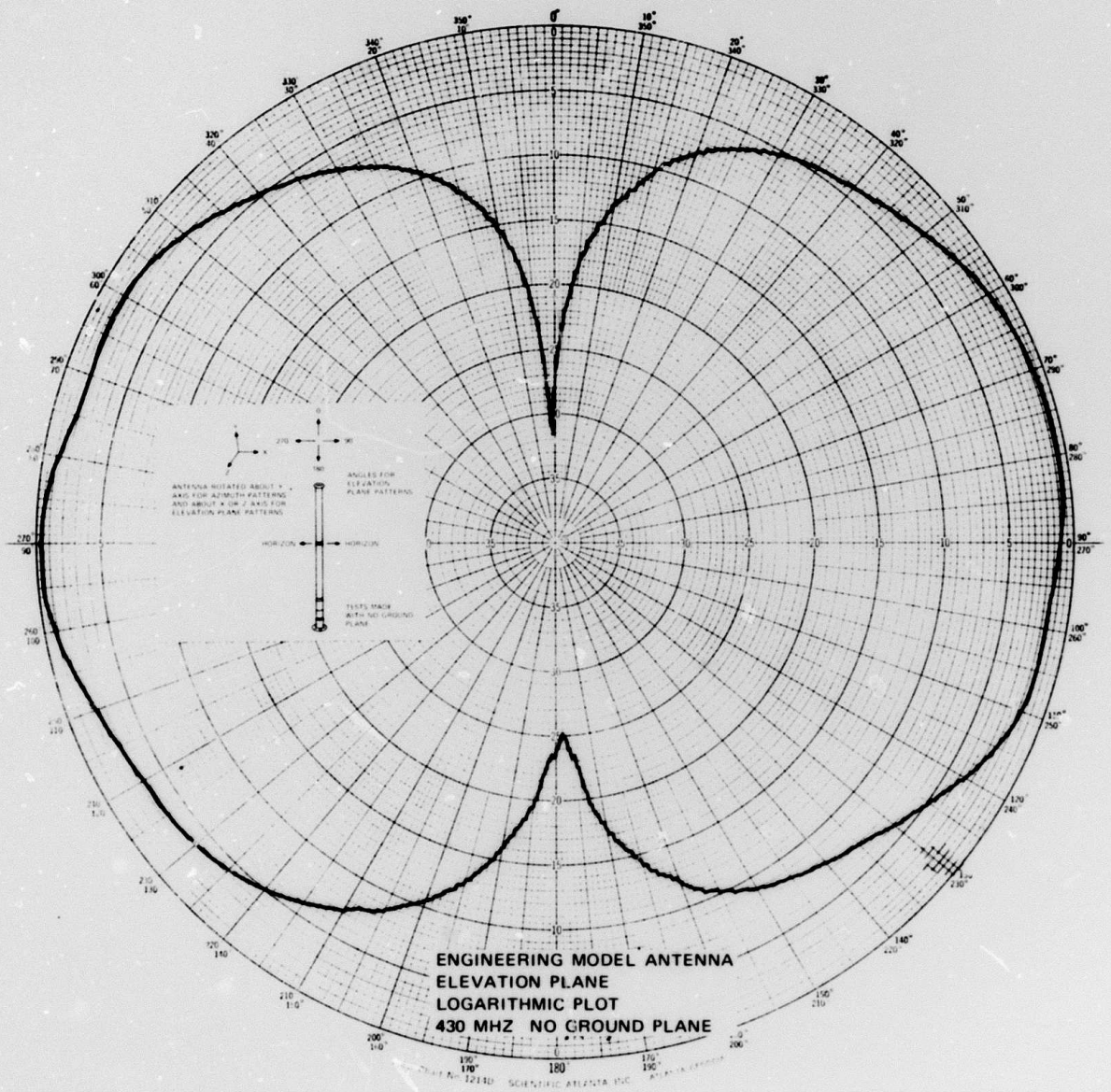


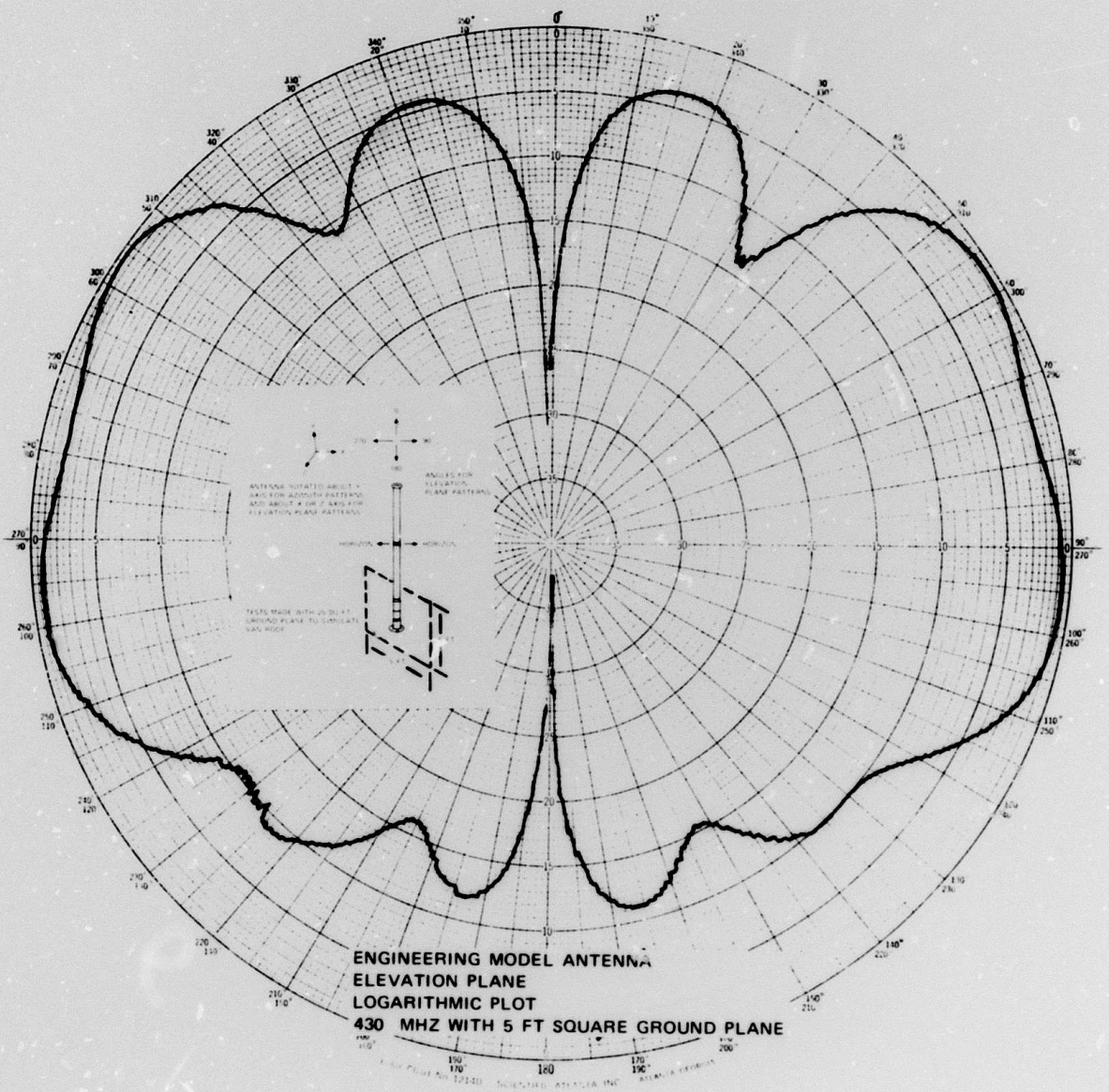
TIME BASE 20 NS/DIV
TOP TRACE 2V/DIV
BOTTOM TRACE 2V/DIV

TYP OF AN UNSATURATED DETECTOR

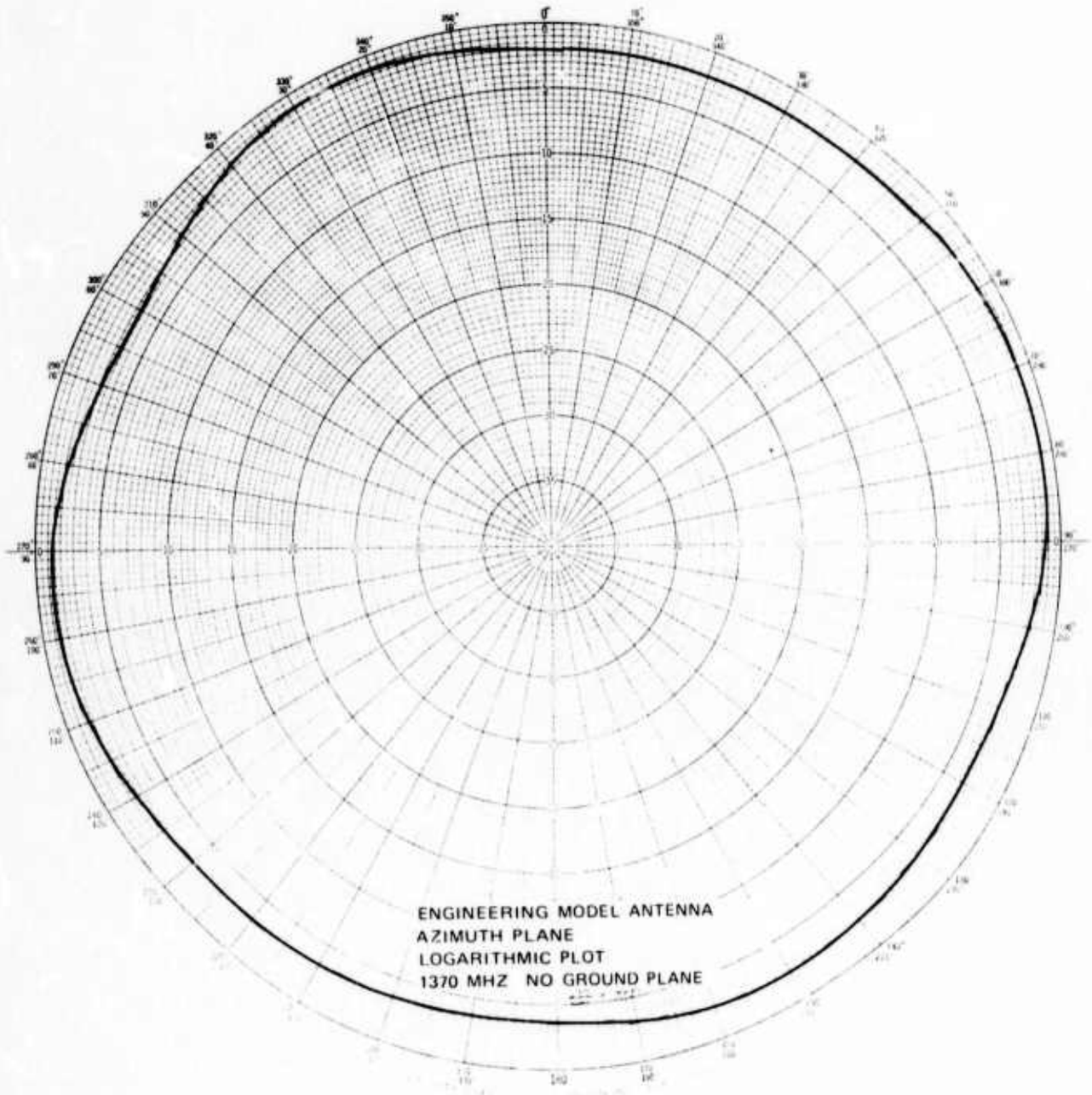
THE DELAY BETWEEN INPUT & OUTPUT NOT VALID DUE TO TEST SETUP

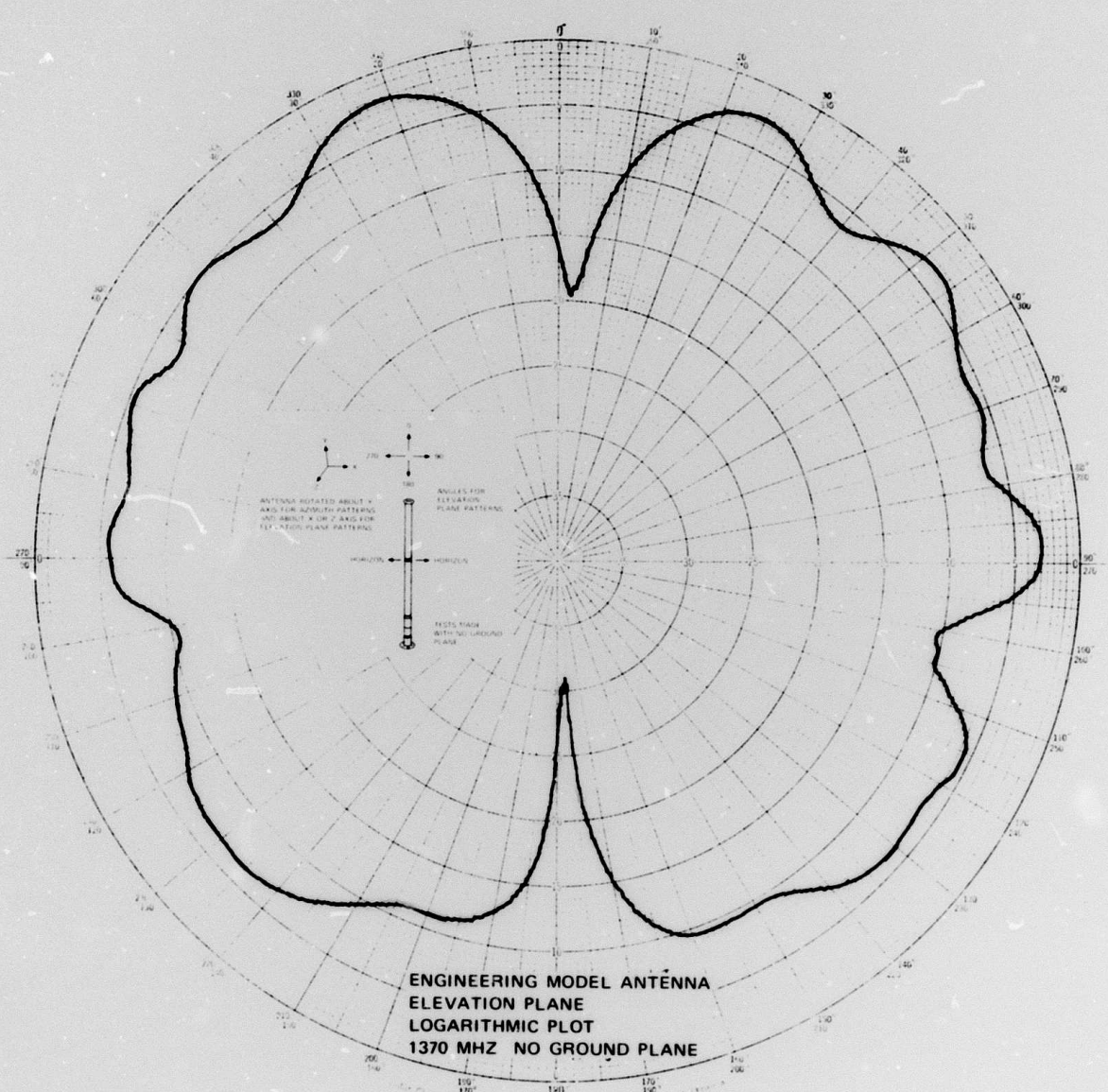

ENGINEERING MODEL ANTENNA
AZIMUTH PLANE
LOGARITHMIC PLOT
430 MHZ NO GROUND PLANE


ANTENNA ROTATED ABOUT Y AXIS FOR AZIMUTH PATTERNS AND ABOUT X OR Z AXIS FOR ELEVATION PLANE PATTERNS
ANGLES FOR ELEVATION PLANE PATTERNS
HORIZON
HORIZON
TESTS MADE WITH NO GROUND PLANE
ENGINEERING MODEL ANTENNA
ELEVATION PLANE
LOGARITHMIC PLOT
430 MHZ NO GROUND PLANE

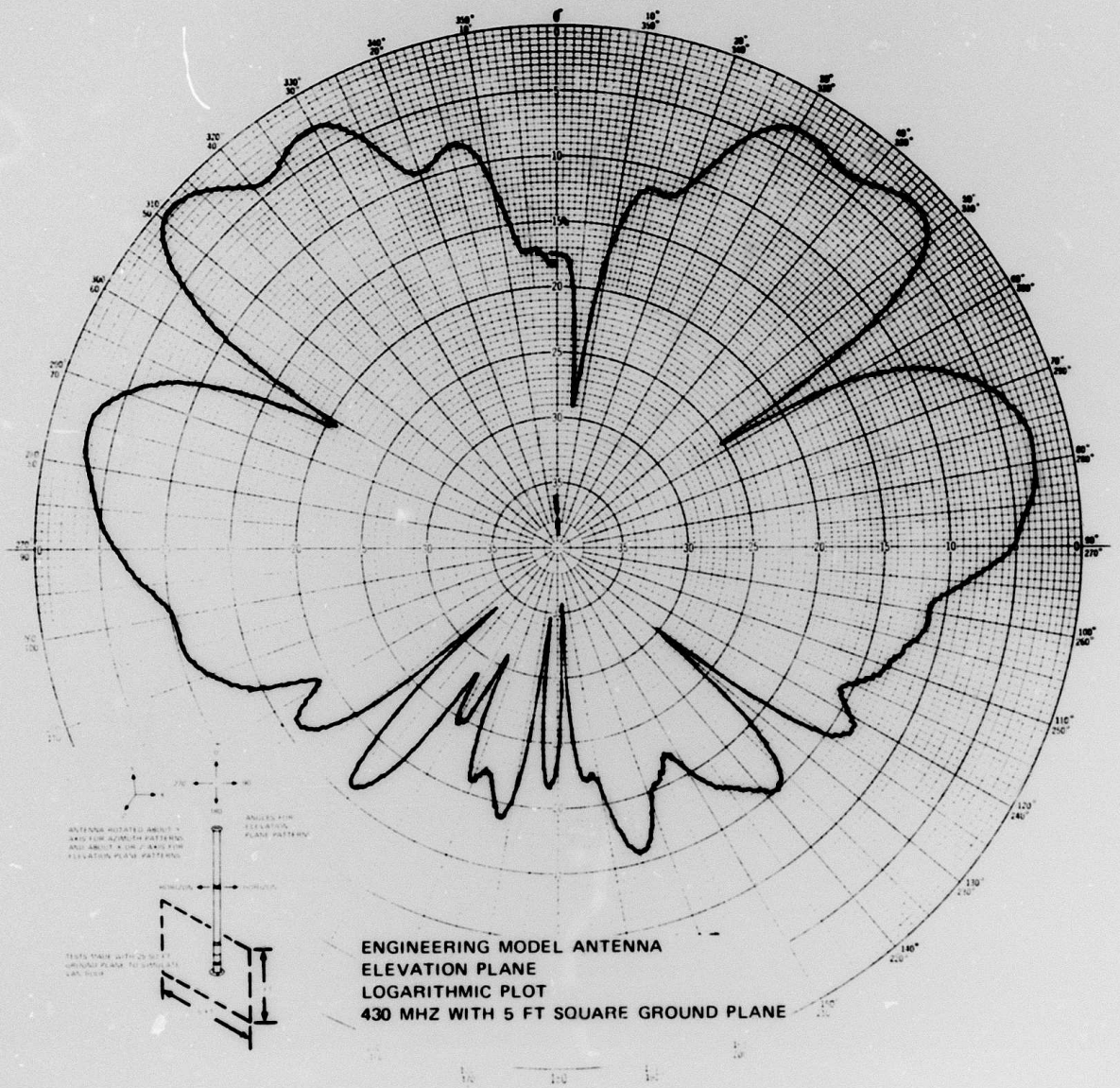


ENGINEERING MODEL ANTENNA
ELEVATION PLANE
LOGARITHMIC PLOT
430 MHZ WITH 5 FT SQUARE GROUND PLANE

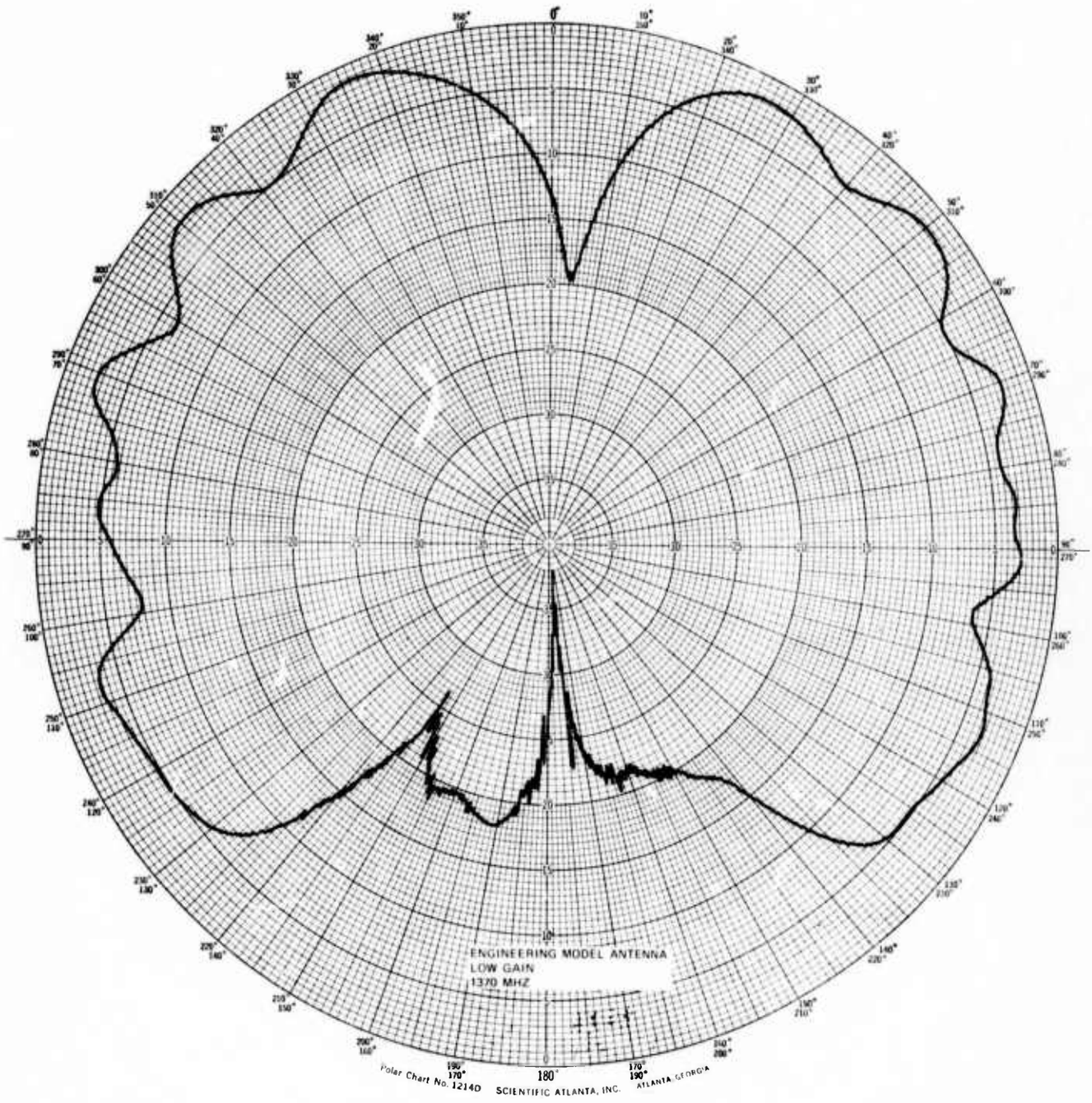

ENGINEERING MODEL ANTENNA
AZIMUTH PLANE
LOGARITHMIC PLOT
1370 MHZ NO GROUND PLANE

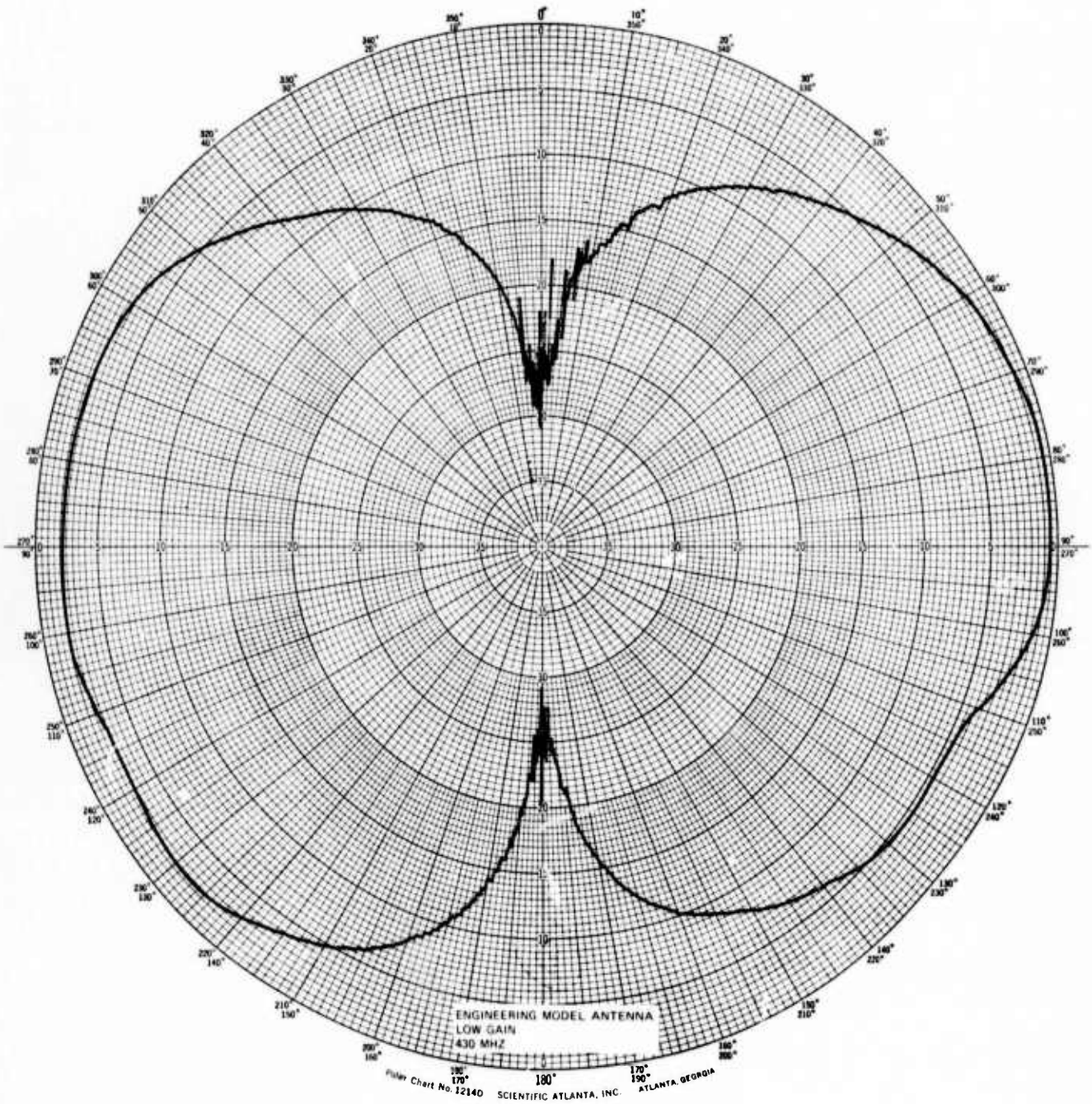


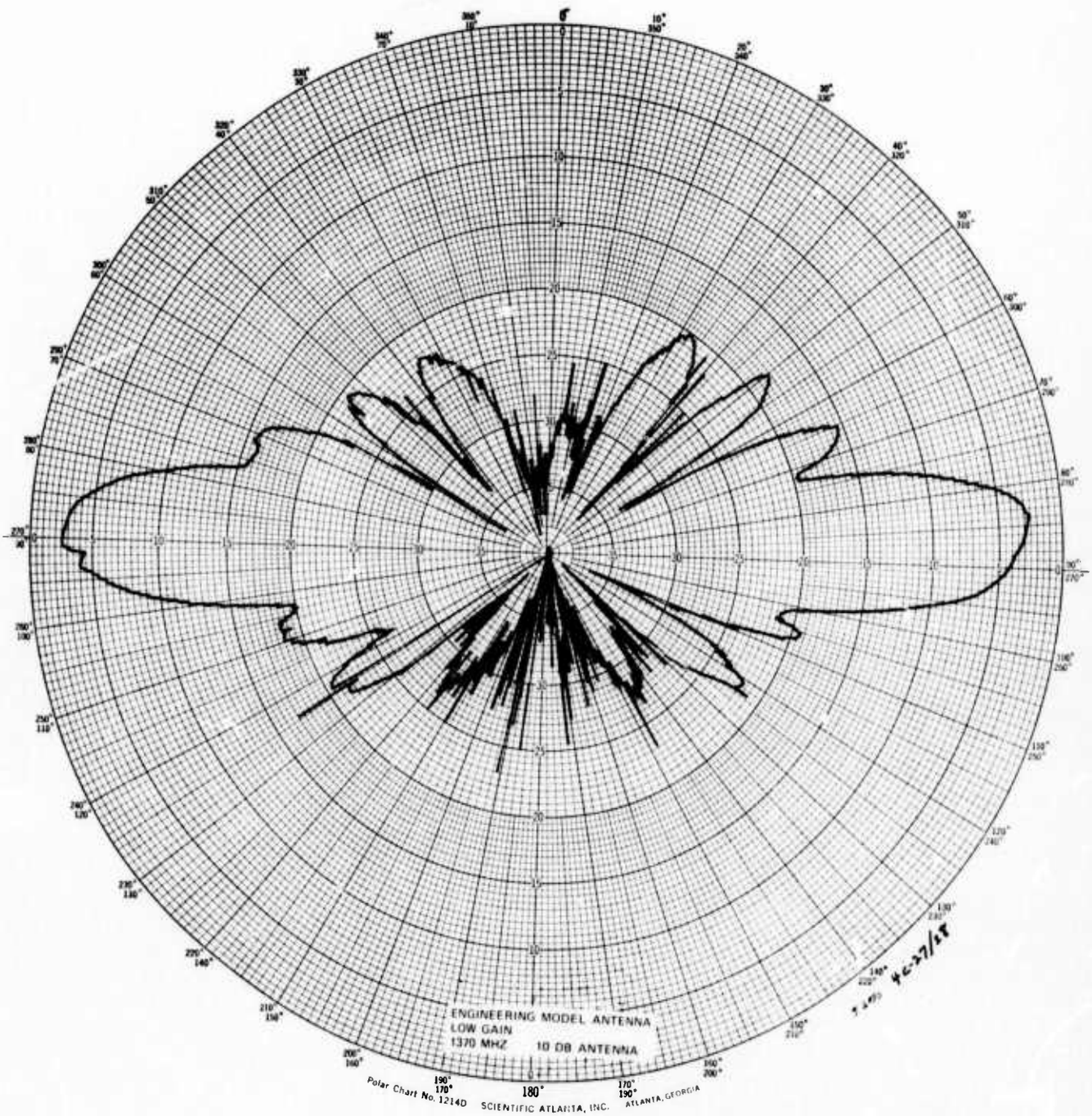
ENGINEERING MODEL ANTENNA
ELEVATION PLANE
LOGARITHMIC PLOT
1370 MHZ NO GROUND PLANE



ENGINEERING MODEL ANTENNA
ELEVATION PLANE
LOGARITHMIC PLOT
430 MHZ WITH 5 FT SQUARE GROUND PLANE


ENGINEERING MODEL ANTENNA
LOW GAIN
1370 MHZ
Polar Chart No. 1214D
SCIENTIFIC ATLANTA, INC.
ATLANTA, GEORGIA


ENGINEERING MODEL ANTENNA
LOW GAIN
430 MHZ
Polar Chart No. 12140
SCIENTIFIC ATLANTA, INC.
ATLANTA, GEORGIA


ENGINEERING MODEL ANTENNA
LOW GAIN
1370 MHZ 10 DB ANTENNA
Polar Chart No. 1214D
SCIENTIFIC ATLANTA, INC.
ATLANTA, GEORGIA

END